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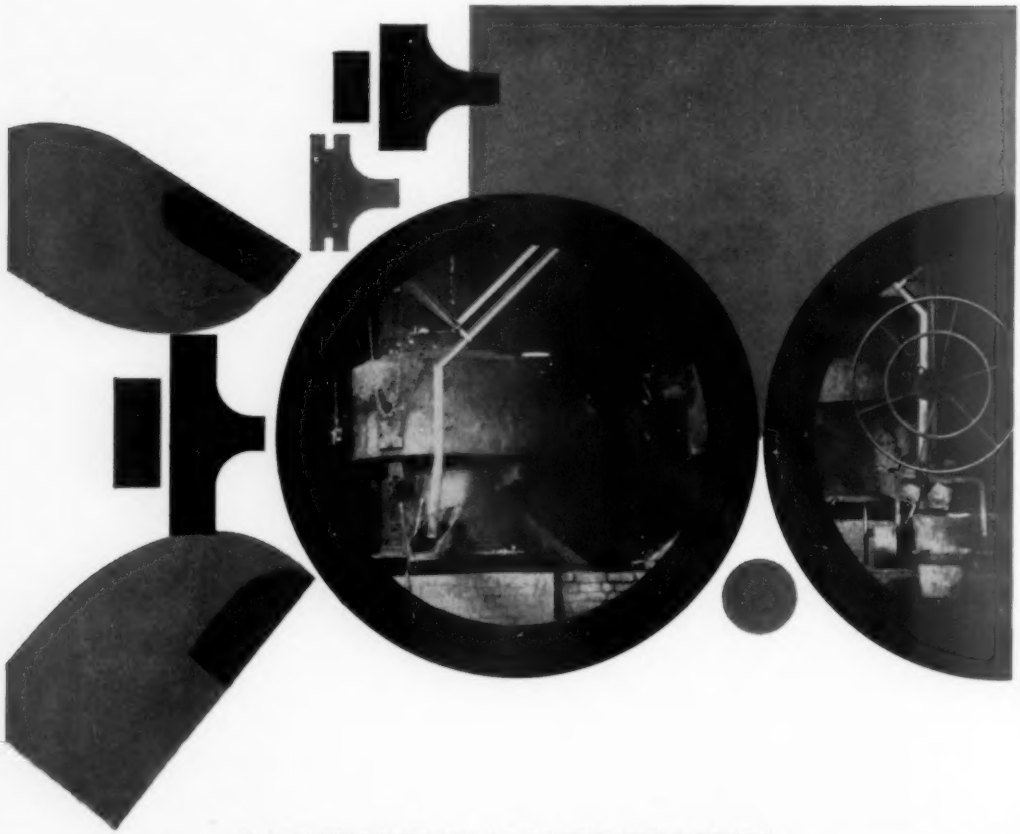

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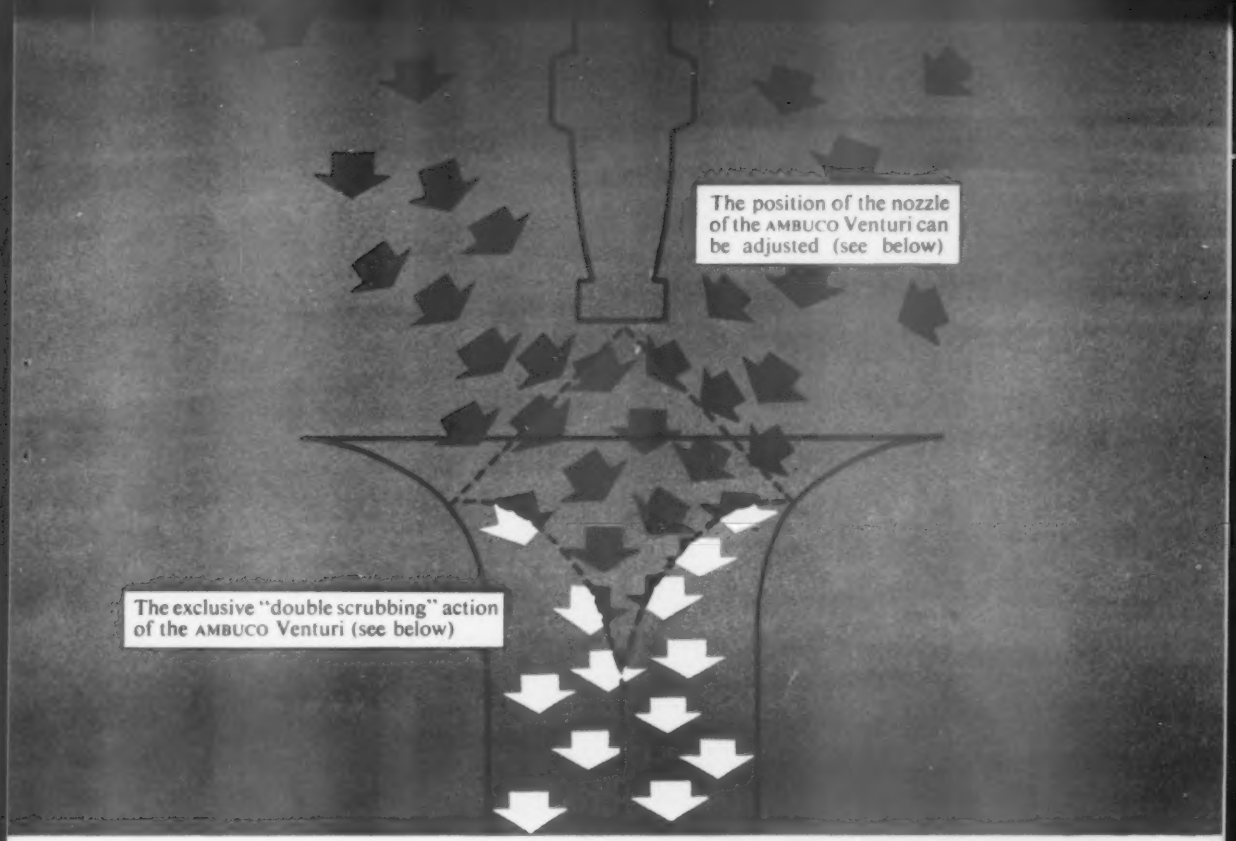
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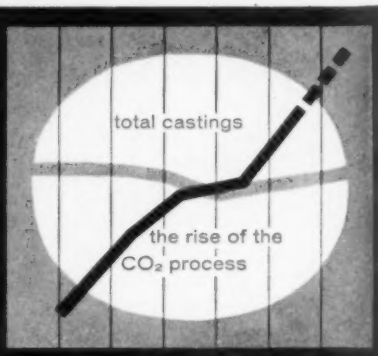

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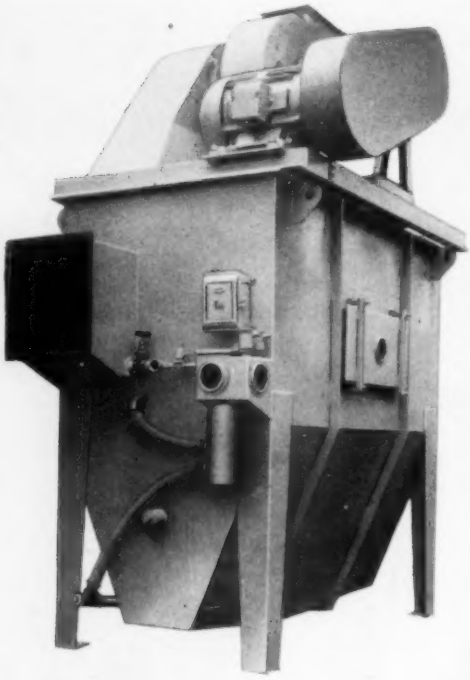

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CO2 SILICATE PROCESS
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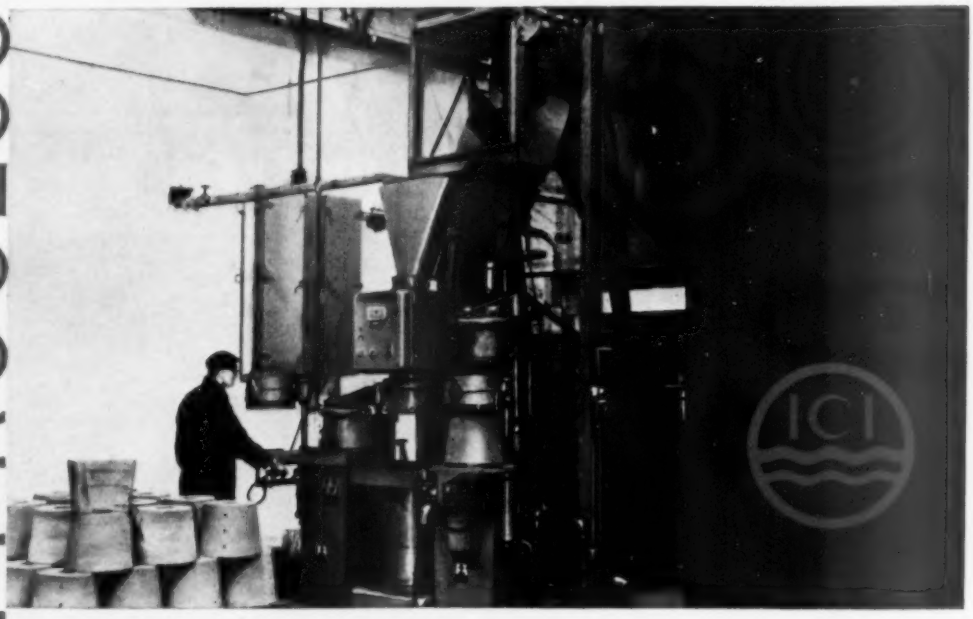

DISTINGTON STREAMLINE PRODUCTION WITH I.C.I. PRODUCTS AND THE CO_2/SILICATE PROCESS

Distington Engineering Co. Ltd. are one of Britain's largest foundries—and one of the most go-ahead. They use I.C.I. products and the CO_2/silicate process for the production of runner and feeder bushes. The dry sand method of producing these bushes was cumbersome and time-consuming, and as bushes made in silicate-bonded sand gave good results, Distington adopted the process and set out to streamline production.

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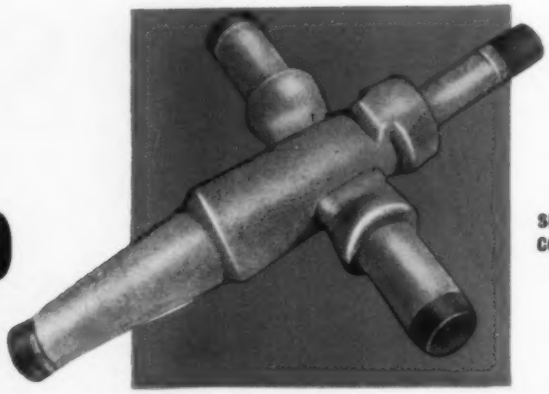

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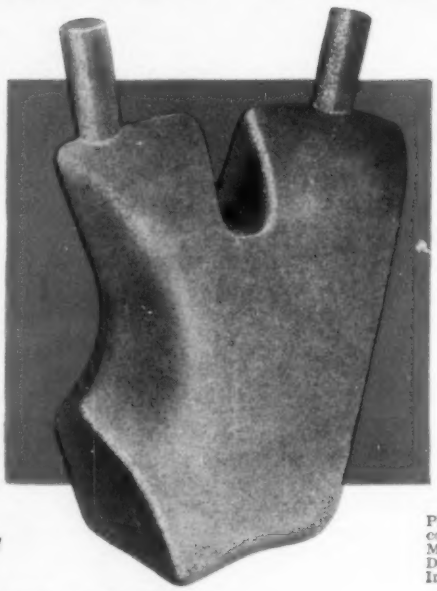
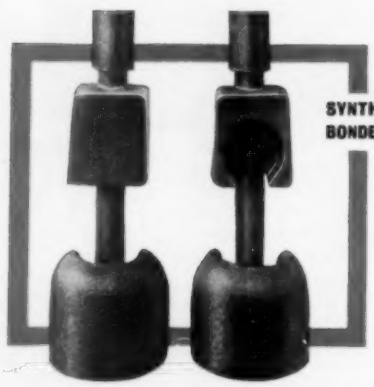


CO_2 CORE



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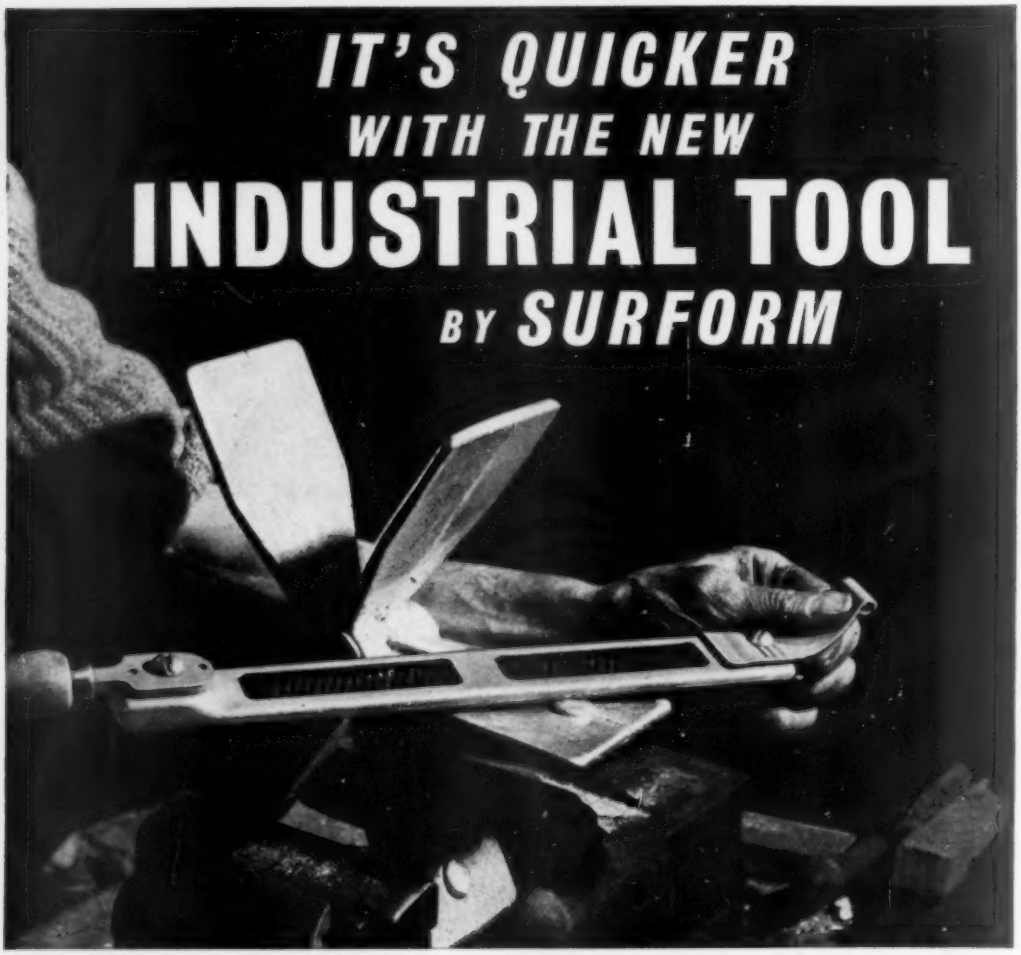

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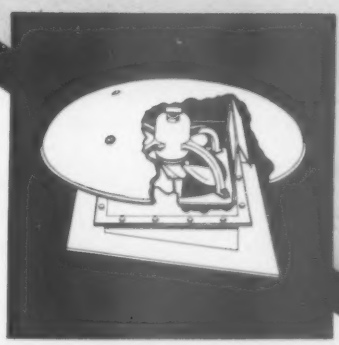

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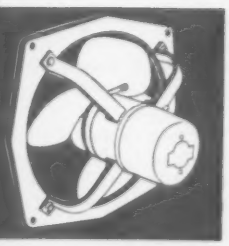

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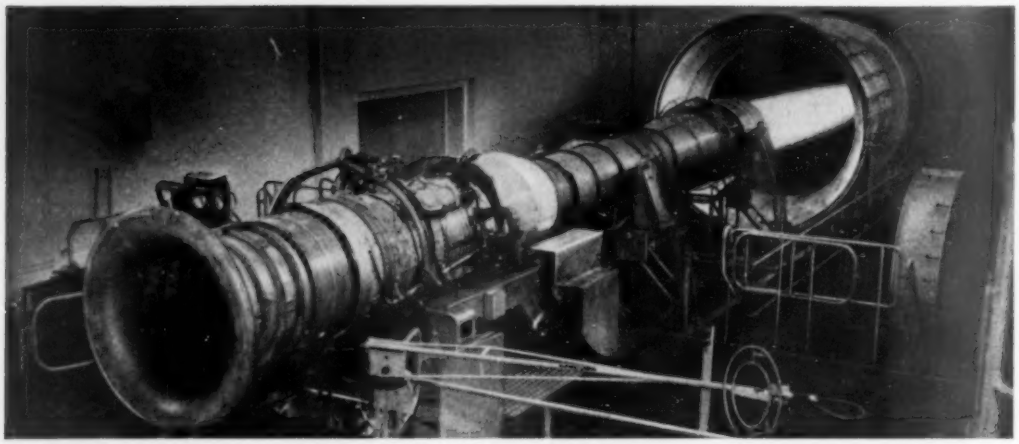


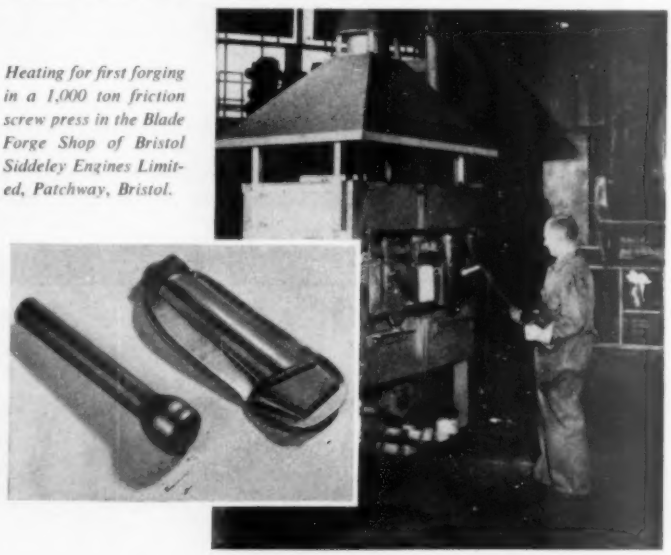
An Olympus 201 turbojet engine on test at the Patchway, Bristol, factories of Bristol Siddeley Engines Limited

The Metallurgical Problems of Gas Turbine Engines

"That gas should be so extensively used is an indication of its versatility and excellence as a precision heating fuel"

Many such problems are encountered by Bristol Siddeley Engines Ltd., a company formed as recently as April 1959 by the merger of Bristol Aero Engines and Armstrong Siddeley Motors, which were the respective aero engine manufacturing companies of the Bristol Aeroplane Company and the Hawker Siddeley Group. The new engine company is one of the largest of its kind in the world and offers an extremely wide range of propulsion units both for manned aircraft and missiles.

There is no doubt that in aero engine manufacture the limitations are almost entirely those of the performance of new alloys and the ability to form and process these alloys satisfactorily. The turbine and rotor blade forge shop at the Patchway Works houses four forging presses varying from 800 to 1,000 tons and six drop hammers from 400 to 2,000 lb. These are fed from ten gas fired muffle furnaces operating through a range of temperatures from as low as 450°C for the low temperature aluminium alloys to 1150°C for the high nickel alloys. In this shop aluminium alloys are heated by air circulation furnaces while Nimonic, stainless steel and titanium alloys are processed in muffle furnaces. The variety of blade lengths ranges from ½" to 12" in overall length, and for some of the alloys a reducing atmosphere is required and obtained from cracked ammonia. The number of blades in a typical engine varies from 1,000 to 2,500 and these represent the number of potential points of a failure if one of these blades is incorrectly formed and processed. The whole of the forge shop uses gas for heating the dies as well as the furnaces, and as was pointed out by one of the engineers, the temperature time sequence using heat resisting alloys particularly is very critical. The soaking period must be



Heating for first forging in a 1,000 ton friction screw press in the Blade Forge Shop of Bristol Siddeley Engines Limited, Patchway, Bristol.

adequate but it must not exceed a defined period. Gas with its uniform calorific value and its ability to be supplied at a governed pressure facilitates the problems of automatic temperature control on those soaking furnaces.

The precision foundry at Patchway also uses considerable quantities of heat resisting alloys for rotor blades and here gas is used exclusively for mould firing with a time cycle of four to eight hours at a temperature of 1000 to 1050°C. Quite recently two new mould firing furnaces were installed as a result of satisfaction with the former gas fired furnaces. In addition, a gas fired rotary sand dryer operating at 350°C provides hot sand used for melting out the wax from the shells in the lost wax moulding process. As will be appreciated, there is a certain amount of scale removing necessary, particularly on the components made from heat resisting steels. For this purpose use is made of the sodium hydride process. Basically, this involves preheating the components to drive off moisture and then immersing in a bath of molten caustic soda to which metallic sodium is added. Hydrogen, made by cracking ammonia is led into the mixture of caustic soda and sodium causing the formation of sodium hydride. The action of this material on the surface of the heat resisting steel components is to convert the oxide scale directly into spongy metal without in any way attacking the metal surface. This is advantageous in terms of the maintained precision of the dimensions of the components, and its other advantage is that a 48 hour sequence by the acid methods is replaced by a 4 hour sequence using the sodium hydride process. The temperature is maintained in the bath, which holds seven tons of the molten material, by four manifolds at the corners of the bath, each of which houses five gas burners.

The other essential features of any gas turbine engine are, of course, the jet pipes which again are made from heat resisting alloy. During the fabrication of these tubes up to 30 in. in diameter and from 15 to 20 ft. in length there is a multitudinous number of seam welding operations and it is essential that these welds are stress relieved before the component goes into service. One way of doing this would be to build a large pit furnace which is expensive in terms of capital outlay and occupies permanent valuable factory space. The Company, however, collaborated with the Industrial Engineers of the South Western Gas Board and between them made use of ring burners which had been employed in an entirely different operation in an entirely different industry. The completed jet tubes are held in position over circular gas jets, each of which is in two semi-circular segments. One end of the tube is attached to a revolving holder and the whole tube is capable of revolving round the complete circle of gas flames. These circular burners can be positioned over the various banks of welds in the tube and the stress relieving operation using gas and compressed air is carried out at a temperature of 950°C. According to the different diameters of the jet tubes, so different diameters of circular burners are used. This is a particular example of how the knowledge of the Industrial Gas Engineers of one industry can be directly applied to another.

Jet pipe weld annealing plant in No. 1 Shop at the Rodney Works of Bristol Siddeley Engines Limited.

In the sheet metal shop, as part of the bright annealing process, town gas is burnt and passed through a catalyst, and burnt after which moisture is removed from the combustion products, so providing the necessary neutral atmosphere in the bright annealing furnaces which ensures that the heat resisting steel components emerge after annealing with a bright surface completely free from scale.

Apart from these above mentioned processes, considerable use of town gas is made by Bristol Siddeley Ltd. at their Patchway factory muffle furnaces, continuous paint stoving ovens, oxy-gas profile flame cutters for many heat treatment processes, and for a variety of salt baths, degreasers and metal processing tanks.

In aero engine design and manufacture the metallurgical problems are considerable and ultimate performance depends upon the condition of the final surface of the metal while this, in turn, depends very largely on the manner in which it is heat treated and finished. That gas should be so extensively used is an indication of its versatility and excellence as a precision heating fuel.

Bristol Siddeley Engines Ltd. acknowledge the constant help which they receive from the Industrial Engineers at the South Western Gas Board and, of course, throughout the vast range of processes employing gas in industry, users and potential users of gas can obtain expert technical advice, quite freely, from their Area Gas Board.

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ROPER

Wet type

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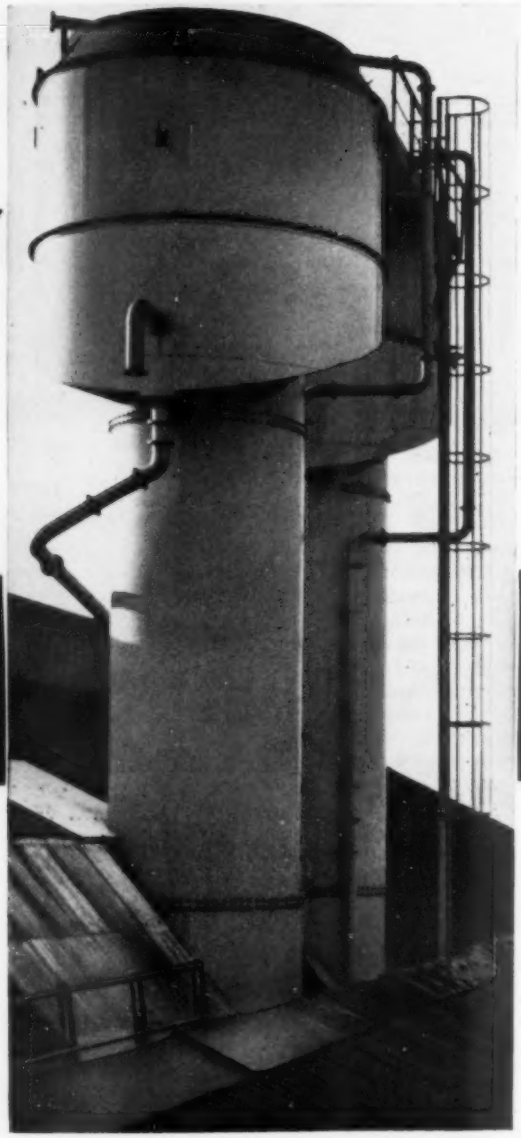

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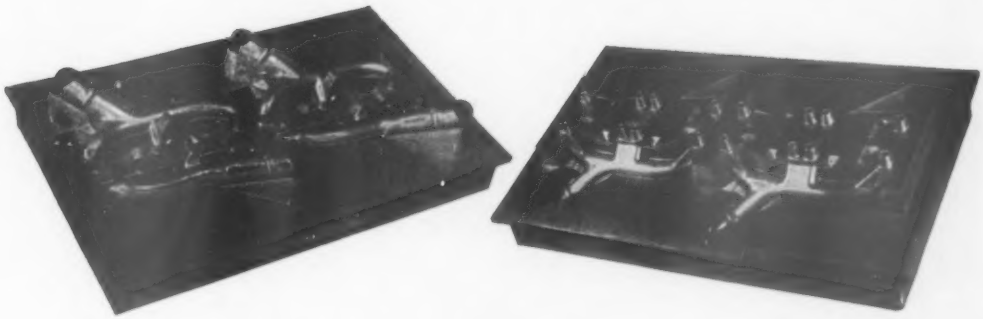

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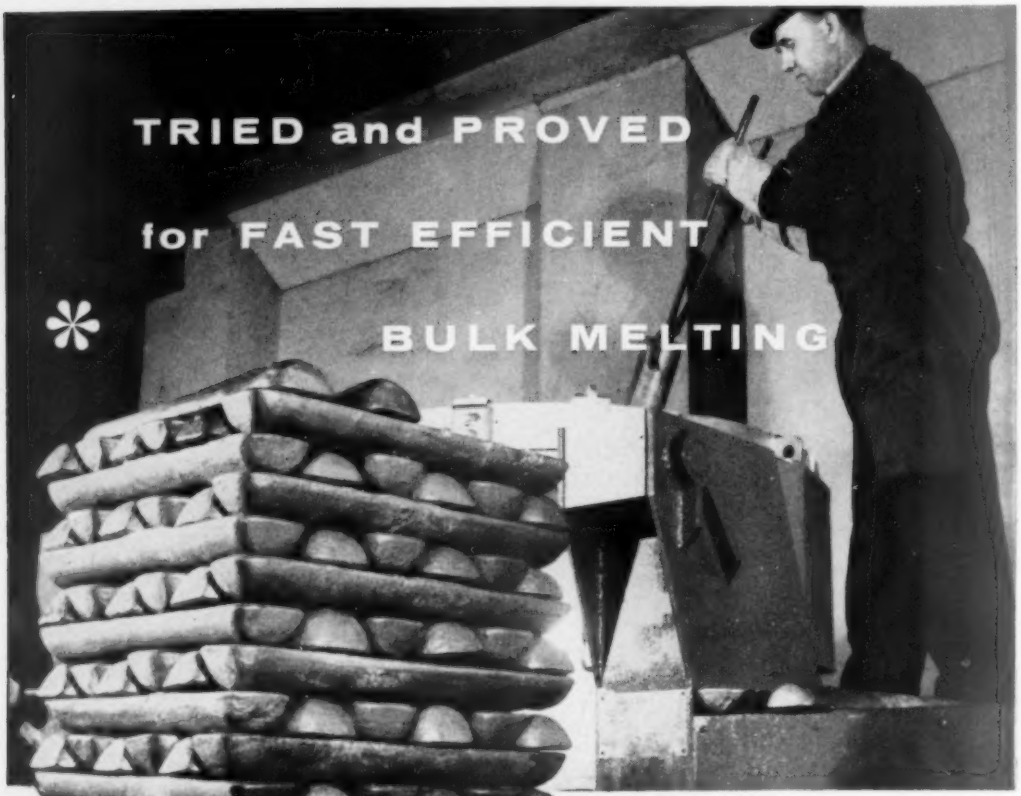

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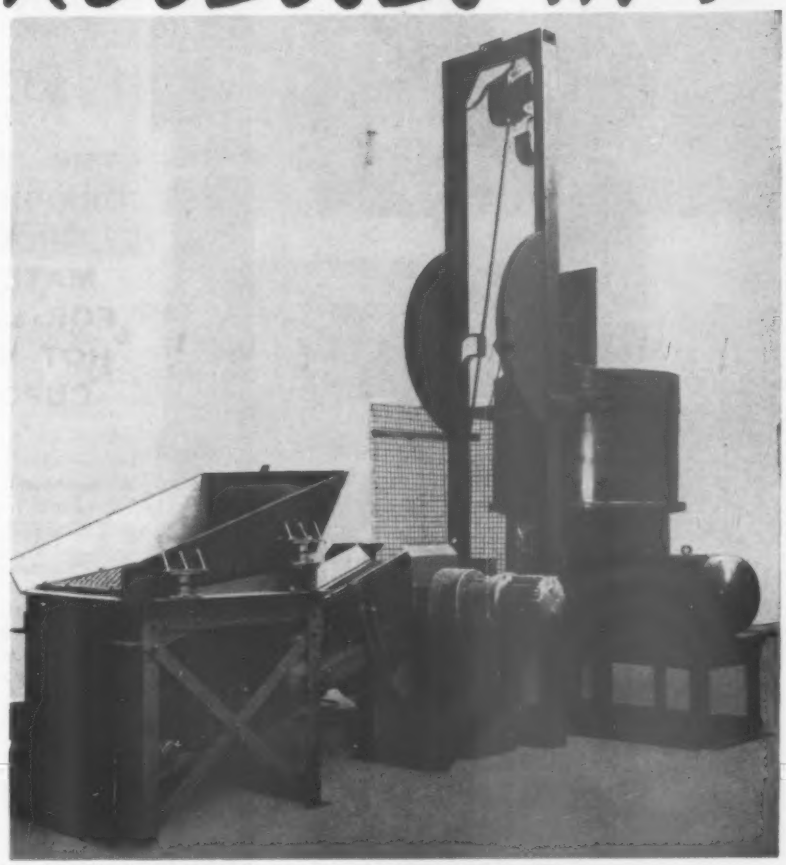

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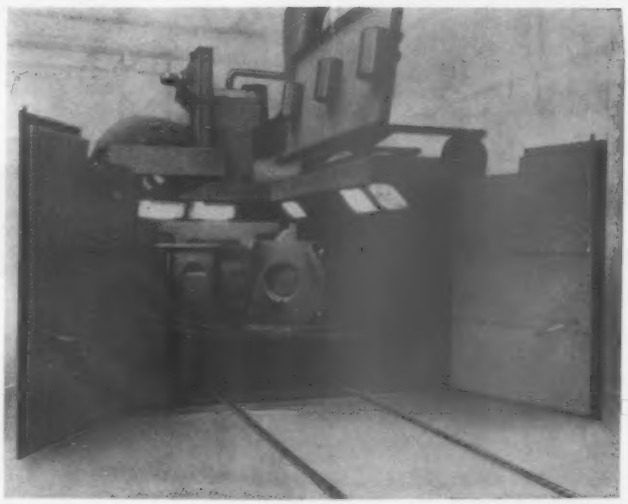
Illustrated right is a Tilghman's Shot Blast and De-coring Room installation at Messrs. Walker Bros. (Wigan) Ltd. The installation is designed to create ultra-efficiency in the removal of sand, the provision of clean air, good working conditions for the operator and high blast power for removing sand from deep pockets.

Air curtains are provided ensuring complete visibility for the operator. A magnetic separator is also incorporated in the abrasive system, and dust, sand and foreign bodies are continuously removed ensuring that only cleaned useful abrasive is re-fed to the nozzle.



The waste sand is conveyed to a Sand Disposal Hopper, which is illustrated on the left, with a lorry in position to receive the waste sand load. Also illustrated is the latest Tilghman 'T' type filter tube dust collector, designed for high efficiency operation. For further details send for leaflet No. T.12R.

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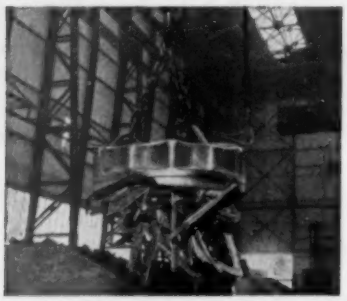
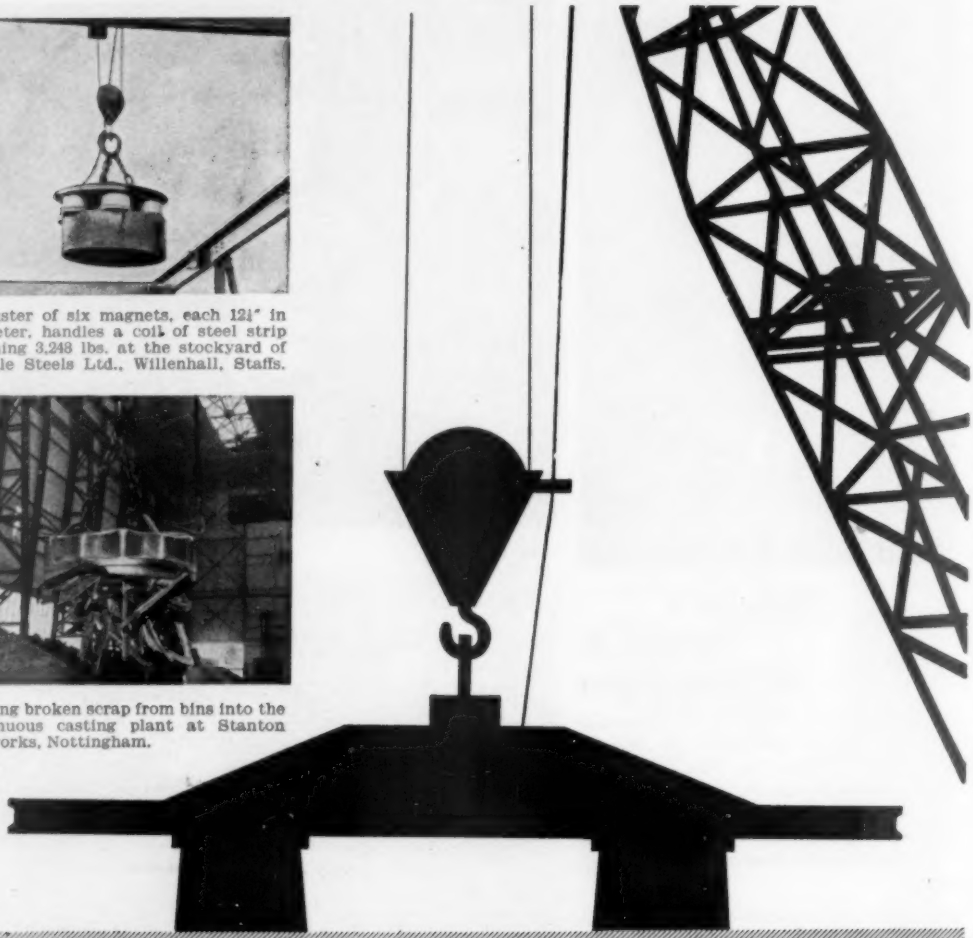
TAYSON T 503

A cluster of six magnets, each 12½" in diameter, handles a coil of steel strip weighing 3,248 lbs. at the stockyard of Ductile Steels Ltd., Willenhall, Staffs.



Loading broken scrap from bins into the continuous casting plant at Stanton Ironworks, Nottingham.



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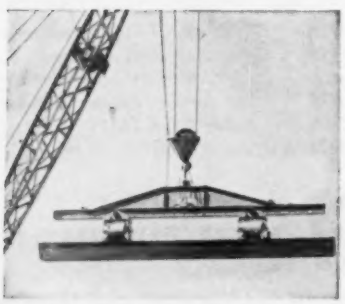

Two bi-polar magnets on spreader beam lifting rolled steel joist.

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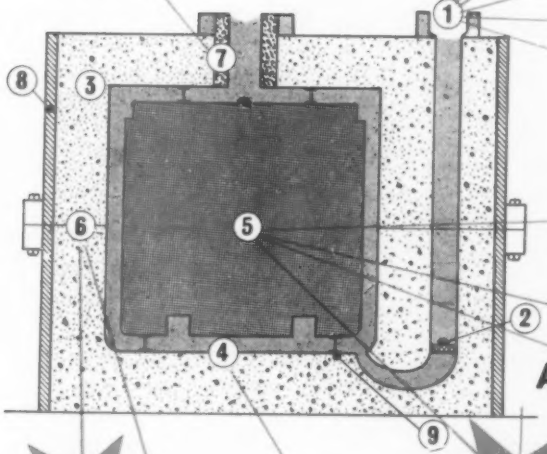

Key to Sectional Dressing of Mould

		Send for booklet No.
1	Metallurgical Control use of Fluxes	3
2	Clean Metal by using Ceramic Strainer Cores and Discs.	4
3	Coal Dust additional to Facing and Backing Sand	1
4	Silverskin Blackings, Plumbago and Mould Dressings.	1
5	Cores using Crulin and Crudol Core Binders (Oil Bonded, Air Setting Cereal or CO.2 Binders).	2
6	Moulds Parted with Beecro Silica Free Parting Powder or Beecrol Parting Liquid.	1
7	Casting Feeding with Alsica Exothermic Feeder Heads.	4
8	Moulding Boxes supplied by B.F.U. Chaplets, Studs, etc.	5

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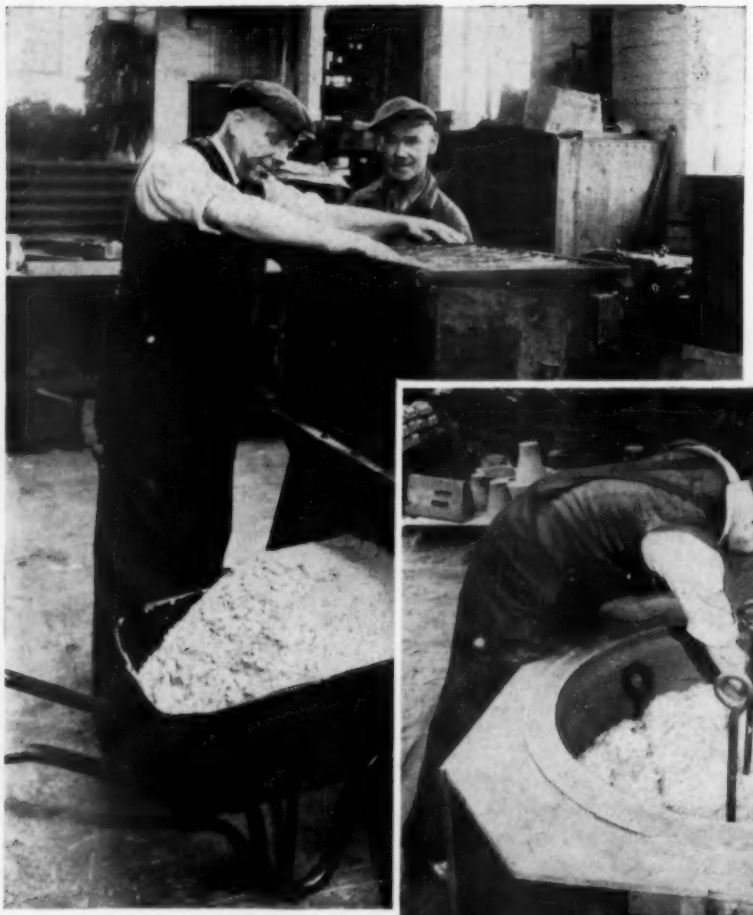

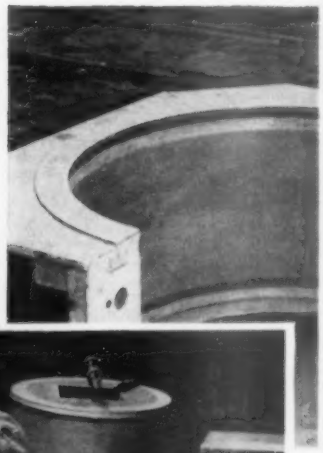

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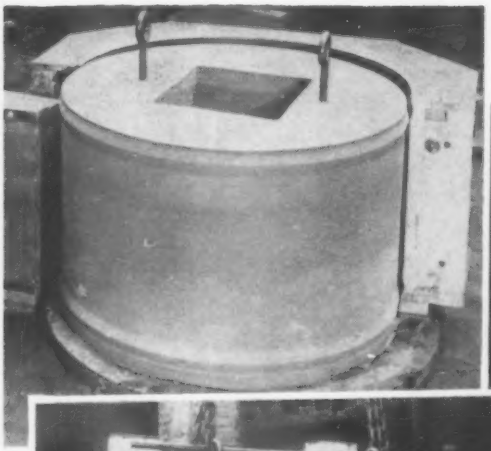

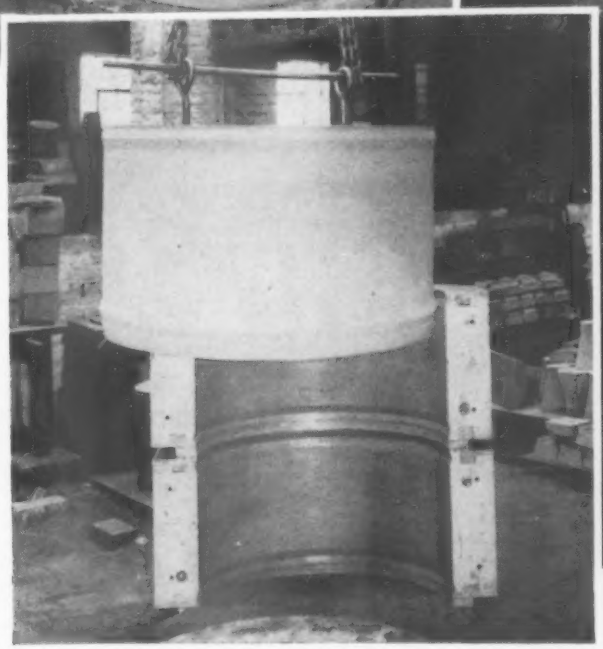

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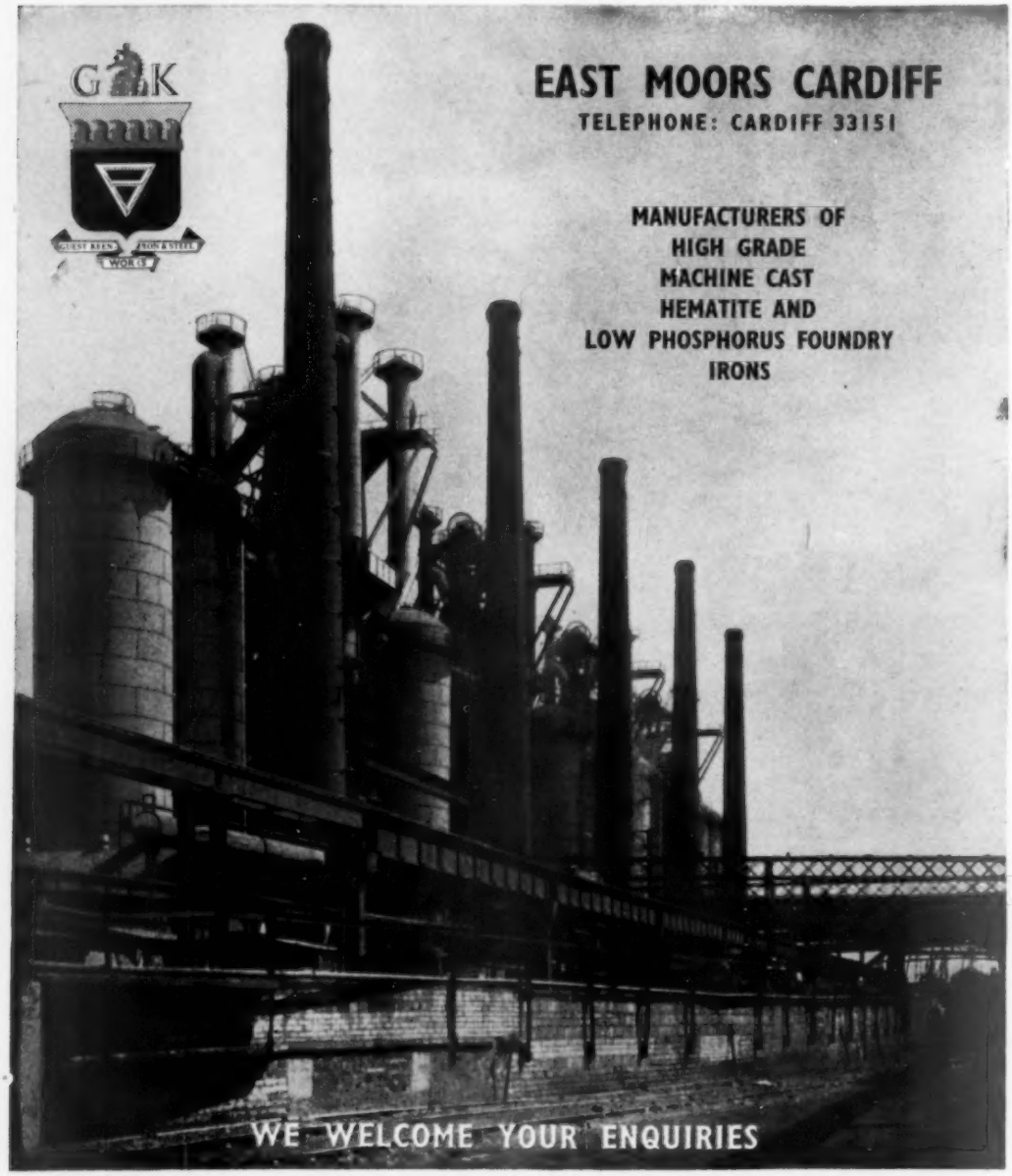

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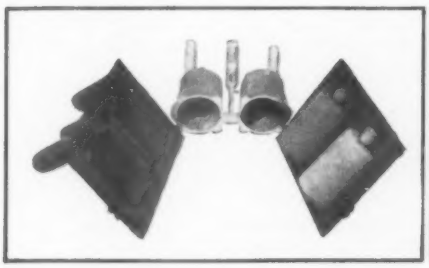

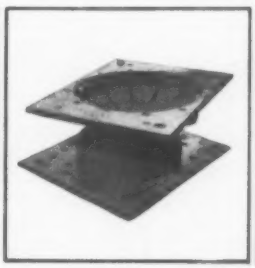

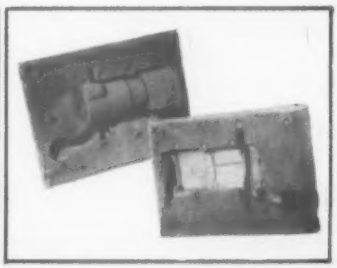

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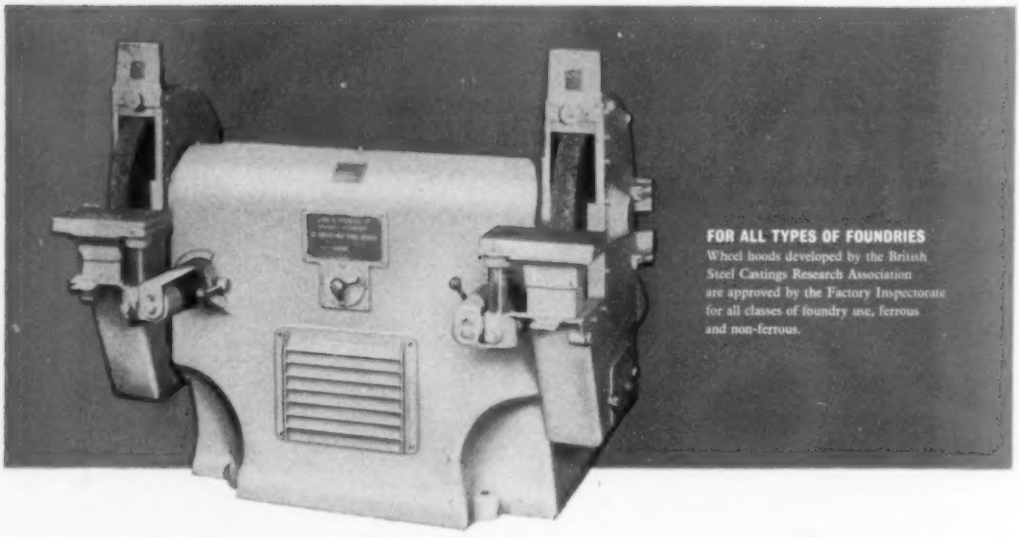

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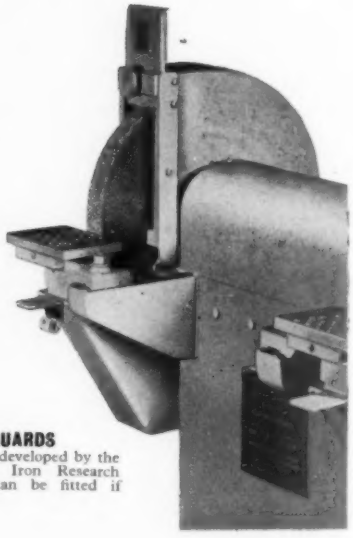

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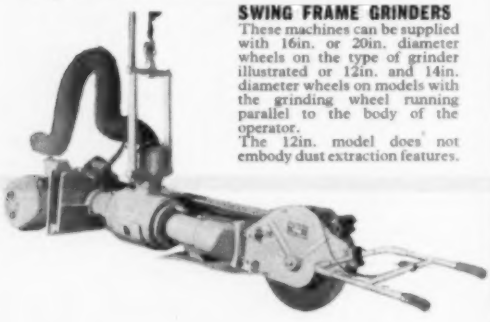

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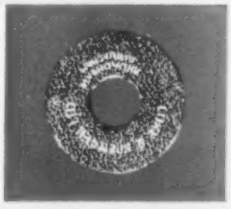

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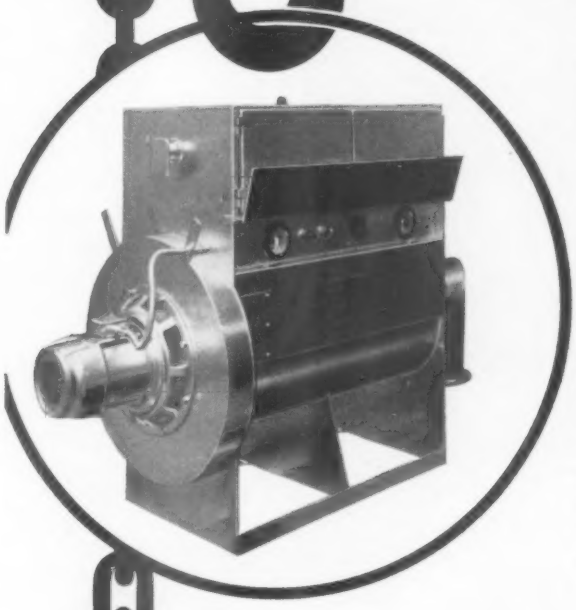

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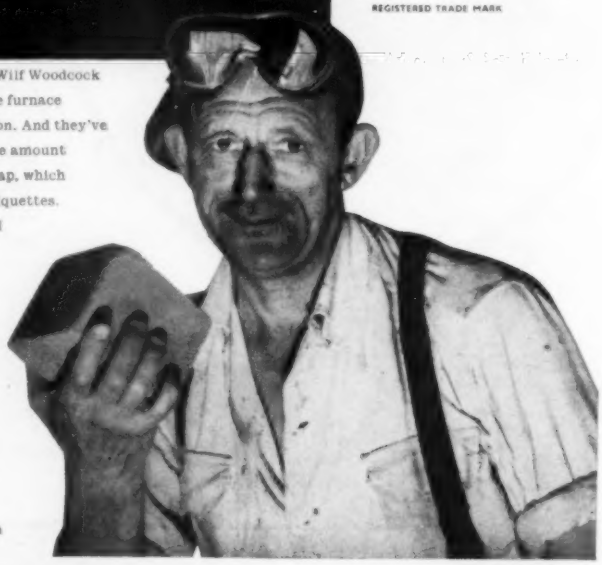

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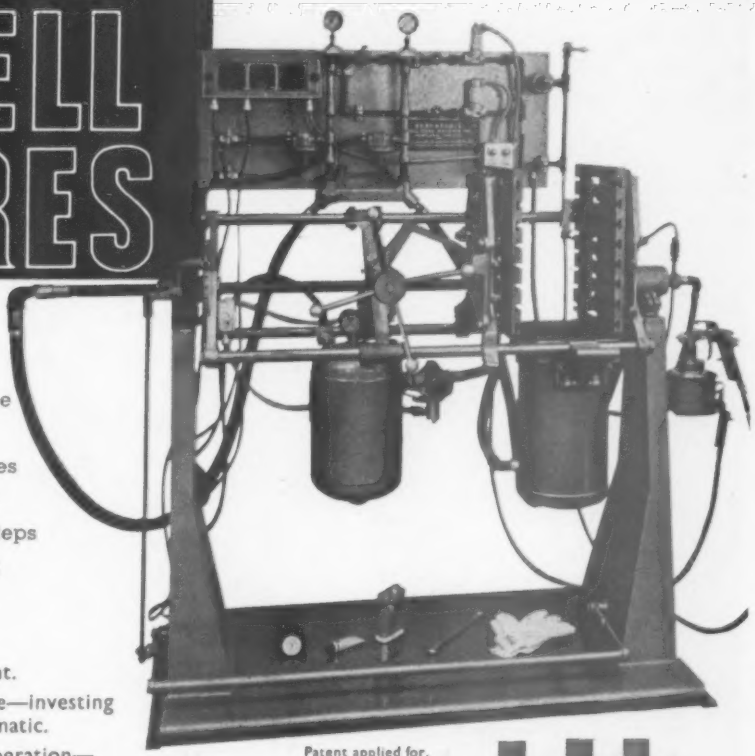

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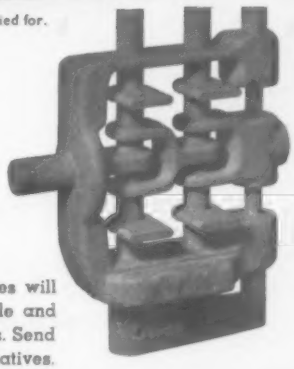

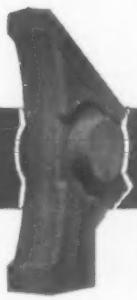

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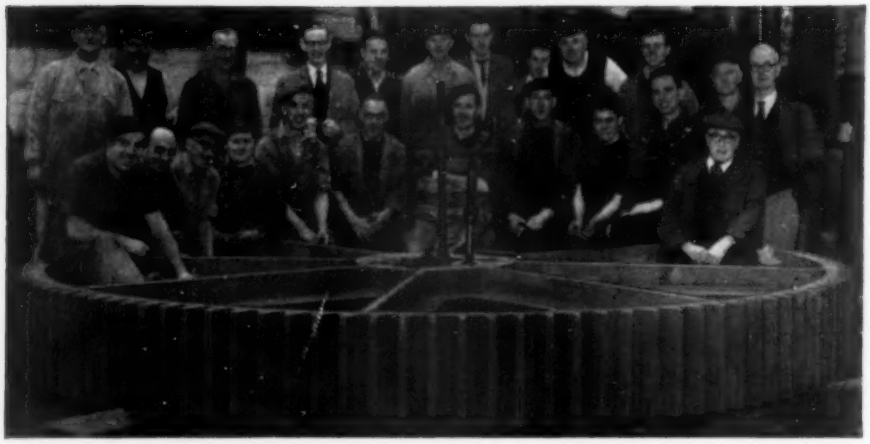

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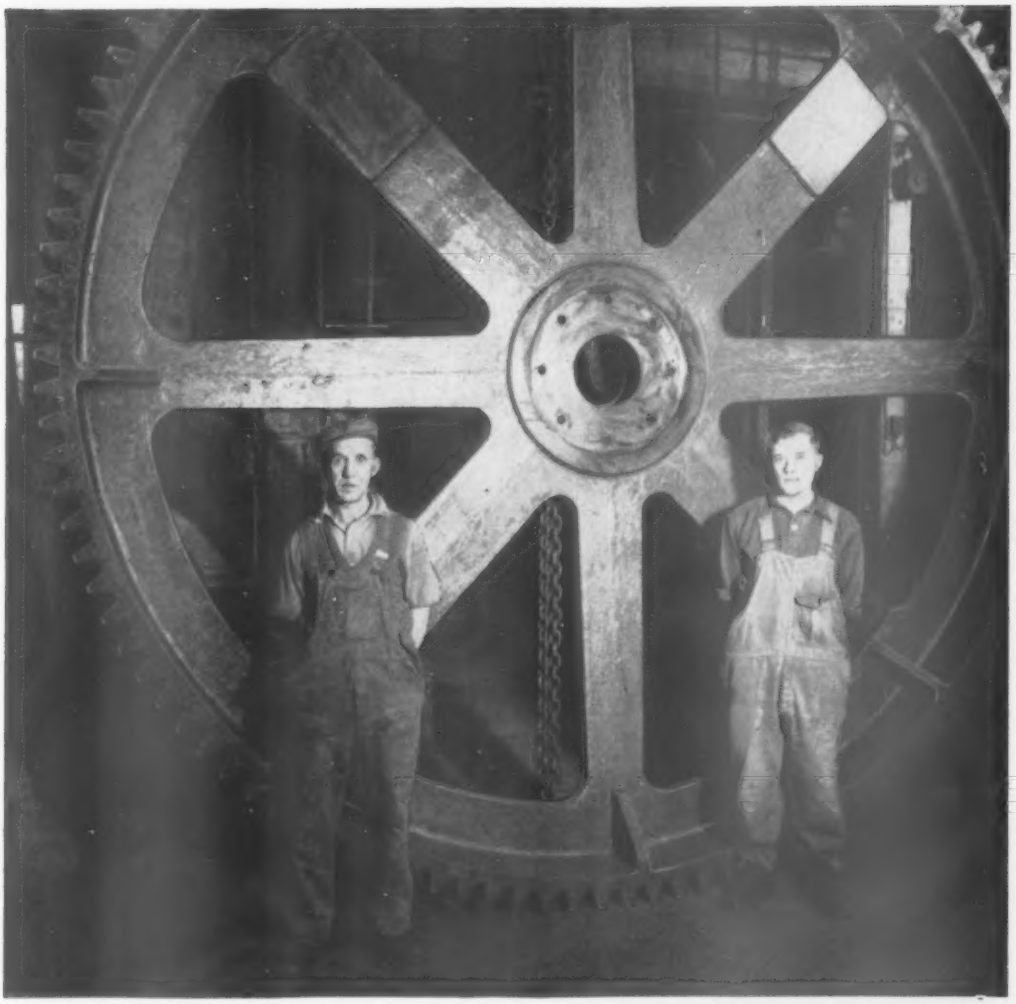

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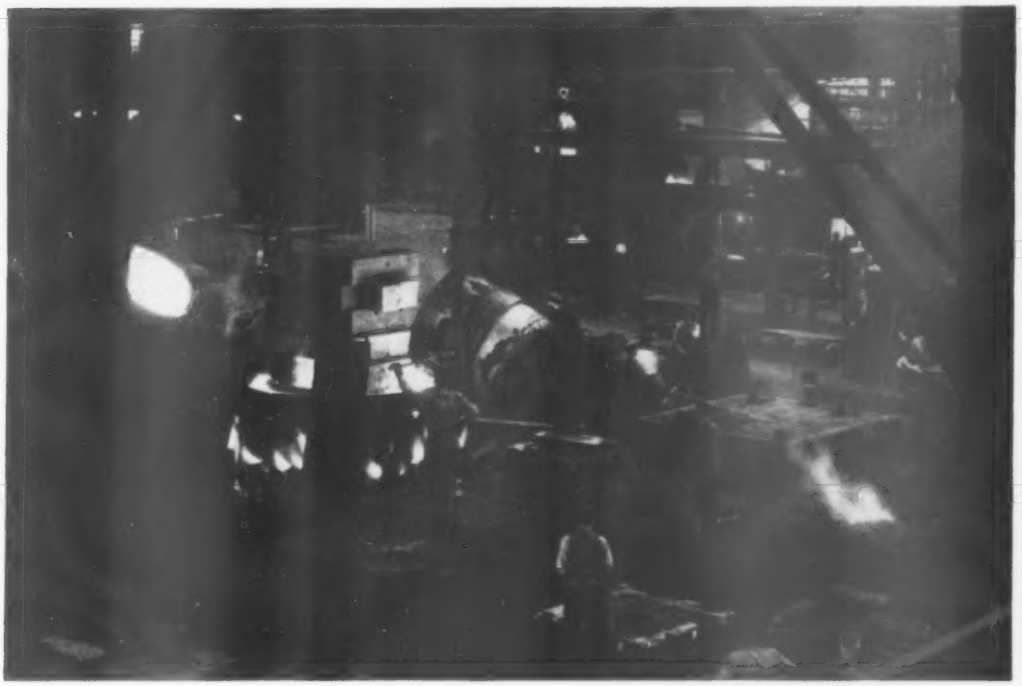

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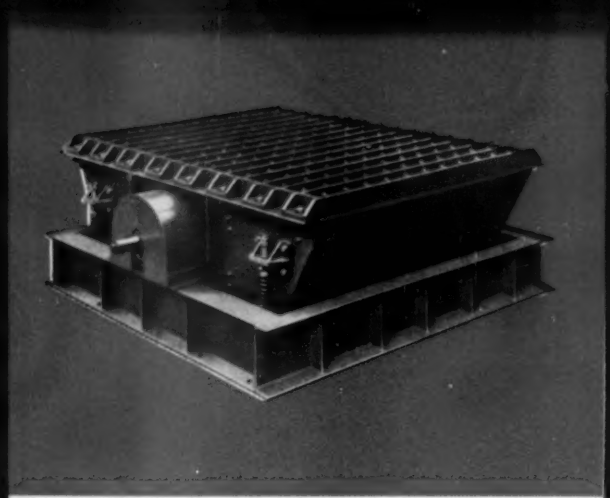

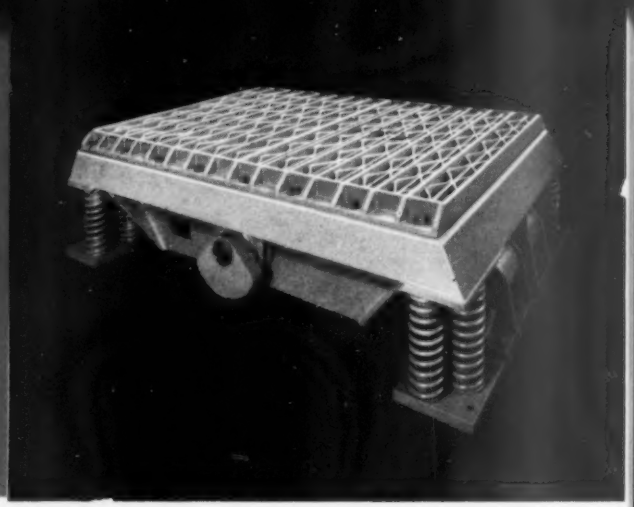

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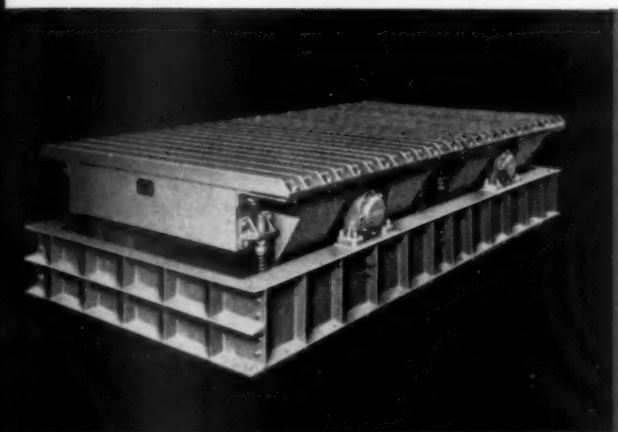

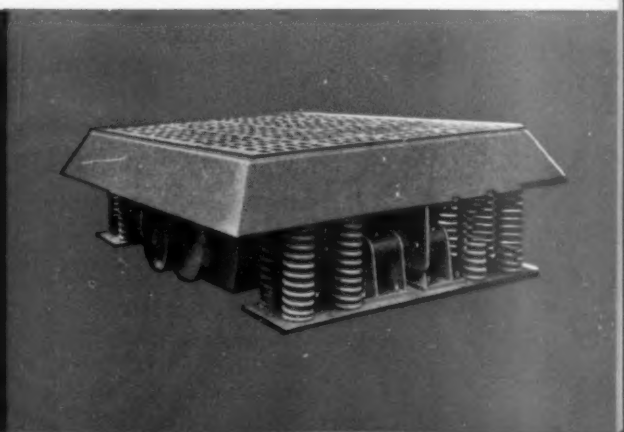

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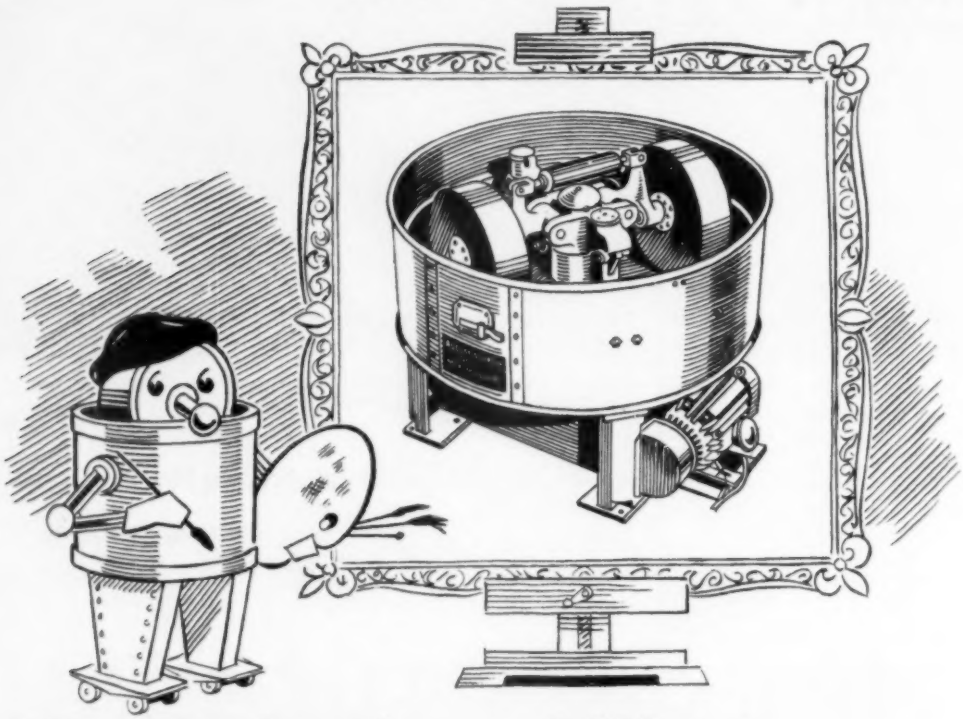

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Noise Abatement

Foundry executives are beginning to be worried at the whisperings of a campaign to reduce noise in industry. It is assumed that people detest noise, yet a large percentage of the population cannot live without a background of noise. The constant blare of radio and the juke-box is apparently appreciated in many homes, cafes and public-houses. Nevertheless, there is, of course, a large section of the population to whom unwanted noise is extremely irritating and where it disturbs rest, people are justified in complaining. The local Press is constantly airing such grievances. Under the New Act,* noise, if it is the subject of complaint by three (or more) members of the public, is deemed to be a statutory nuisance within the compass of the Public Health Act. The latter lays down the powers under which a local authority can institute legal proceedings, and require the occupier of the premises to abate the nuisance.

Yet the matter of noise needs to be kept in perspective. After all, local employment and housing authorities would be quite embarrassed if founders decided to re-site their works in open country. On the other hand, firms seeking to build new works on green-field sites have sometimes been faced with severe restrictions as to noise and smoke before the local authority would grant permission for foundry development. Foundry noise may have repercussions in two directions: first, from the point of view of internal working conditions—the concern of the Factory Inspectorate—and second, in the reactions of persons living in the neighbourhood, whose complaints may be channelled through the local authority, as mentioned previously. Some foundries, especially those using jar-ramming machines, are obviously noisy, but the latter are so efficient for many lines of production that, at the present state of the foundry art, they cannot economically be replaced. Complaints of noise sometimes arise from the operation of cupolas, the origin of the sound being somewhat obscure, as it would appear to be related to the furnace itself, possibly tuyere design or the mode of operation. Here, the known systems of noise suppression do not apply, as the noise seems to result from mechanical vibration of the whole structure.

The science of noise suppression has not really made much progress. Here and there, appear reports of noise reduction through the introduction of insulating screens and pads. Obviously, however, the best method of tackling the matter would resemble treatment applied to the dust problem, where great efforts have been and are continuing to suppress the formation of the nuisance at its source. The installation of screens and pads—though perhaps the best that can be done at present—is but a confession that noise generation cannot be prevented. Thus, at the moment, there is little the foundry executives can do other than attempt to redress the worst cases. In the shops, for example, they can provide ear-plugs for those who find the noise distressing. There is a great need for all in the industry to keep themselves abreast of developments directed towards the reduction and suppression of industrial noise; here, the foundry research associations can help with documentation. No doubt noise suppression will grow in importance and foundry plant and equipment engineers should direct more attention to the problem, even to the extent of devizing silent methods of producing castings and processing them through to the despatch deck.

---

* Noise Abatement Act, 1960," available from HMSO, Kingsway, London, W.C.2 (and other branches), price 6d.

Correspondence

To the Editor of the FOUNDRY TRADE JOURNAL

BRAKE-DRUM PROBLEM

SIR,—As manufacturers of grey and high-duty iron castings for automobiles, our range of products includes cylinder-blocks, -heads, flywheels, brake-drums, inlet and exhaust manifolds for passenger cars.

We are at present having heavy rejections—due to microporosity of the brake-drums. The rejection percentage in the foundry is below 5 per cent., but we find that up to 50 per cent. of the castings are at present rejected in the machine-shop, due to fine porosity which is found in one or two spots on the braking surface of the drum. The porosity is found in the final operation of polishing of the braking surface. It appears in the form of specks at the position shown in Fig. 1. Sometimes, a considerable number of specks are present, but many of the castings are found to have only very few specks, though sufficient to incur rejection of the component. The illustration shows the section of the mould, the major dimensions, the gating system (dimensions quoted in Table 1), and also the appearance of the porosity which we are at present experiencing.

The brake-drums are moulded in greensand, the cope being made in a moulding box 6-in. deep, the drag being made in a moulding box either 6- or 4-in. deep. Moulds are made on a jolt/squeeze, pin-lift machine, pressure of air being 80 lb. per sq. in.; the sand employed is the synthetic type with 4 to 4.5 per cent. moisture, 60 to 80 per cent. permeability and 10 to 12 lb. per sq. in. strength. The composition of the metal used is: Total carbon 3.1 to 3.2, silicon 2.0 to 2.2, phosphorus 0.2 to 0.3, and manganese above 0.6 per cent. Brinell hardness is between 210 to 240 and the metal is poured at about 1,450 deg. C., pouring time being 6 to 7 sec. All metal, sand and moulding operations are being controlled.

TABLE 1.—*Brake-drum Dimensions and Sizes of Running Systems Employed (all in inches) (See Fig. 1).*

Drum Size	A	B	C	D	Sprue (D)	Runner (R) (x)	Runner (R) (y)	Runner (R) (z)	Ingate (e)	Ingate (f)	Number of Ingates
Large (a)	7⅛	⅜	½	2⅛	⅞ min. by 6	⅜	½	1	1¼	½	Six
Small (b)	6⅜	⅛	½	2⅛	⅞ min. by 6	⅜	½	⅞	⅜	⅛	Eight

We have tried to bring down the Carbon Equivalent, but the results are not satisfactory, the microporosity still persisting. We have not yet attempted any change in the gating system, as we know that it is a usual gating system adopted for brake-drums.

We would like to receive comments from your readers and suggestions how to improve our practice, and hope the matter can be treated with some urgency.—Yours, etc.

"DRUMMER."

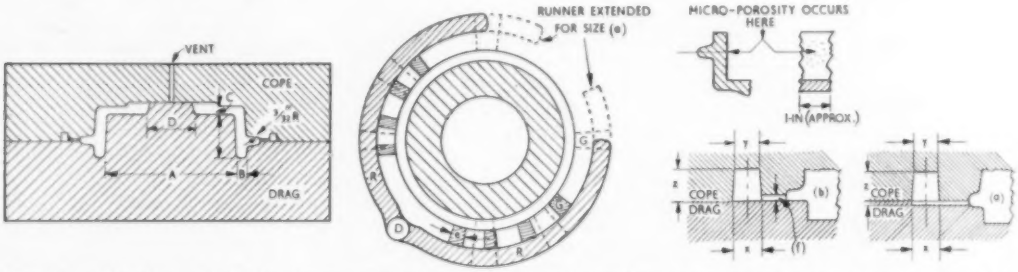


FIG. 1.—*Sketches of brake drums and the moulds and running systems at present used for their production (the broken lines indicate the running system for the larger—type (a)—brake drum). The location of defects is also shown. (See Table 1 for dimensions.)*

British/East German Trade Increase

Britain's import/export trade with East Germany rose by more than £2,000,000 in the first seven months of 1961 compared with the same period in 1960, and more than £5,000,000 compared with the first seven months of 1959. According to figures published by the Board of Trade, British imports from East Germany at July 31, 1961, totalled £4,464,542 compared with £3,962,638 in 1960 and £2,853,426 in 1959. Exports to East Germany totalled £5,168,163 compared with £4,298,596 in 1960 and £1,667,569 in 1959. Total British/East German trade (including re-exports) for the first seven months of this year came to £11,192,648 compared with £8,706,057 in 1960 and £5,090,220 in 1959.

BISRA Research Section Renamed

In recognition of the steady growth in the scope of its activities over recent years, the computer applications section of the Operational Research Department of the British Iron & Steel Research Association has now been renamed the systems evaluation section. The duties of the new section, which will be headed by Mr. D. H. Kelley, B.SC., will be to carry out operational research investigations into the automation of large-scale systems. The immediate programme will be to study the automatic production planning and scheduling of various kinds of steelworks, and to investigate the information requirements of steelworks management.

Technical Education of Foundry Apprentices

*By M. Callaghan**

After first stressing the importance of having well-trained personnel in the foundry industry, the Author deals briefly with the training centres and associations which help towards filling this need, and then deals fully with the work done at the David Dale College, Glasgow. How a college foundry can be set up is described and the training given at the College in the subjects of foundry practice and patternmaking is outlined. The account should help foundry and educational groups in this and overseas countries in formulating plans for establishing or enlarging their own foundry colleges. The article is especially appropriate at this time of year, when many young people are enrolling for the new session at technical schools and colleges.

Well-trained personnel are essential in every branch of the foundry industry from labourers to the chief chemist. This is because the production of a good casting could hang on whether or not any one of them really knows his job. In the foundry industry, it is not a case of one man, one product, but of many men contributing to the making of any one casting. It follows that a poor effort by one man can spoil the good efforts of others. Being well trained for one's share of foundrywork is therefore essential in four respects. First, to the individual, because being properly trained should give him confidence, a sense of security, and an interest in the work he is doing, because he can do it well. It is important to the firm also, because well-trained staff can be trusted to do a good job and so their high executives can be relieved of some of the worries. Moreover, when they possess well-trained personnel, firms can accept orders for difficult-to-make castings—and these seem to be increasing—because they can be confident that they have staff who can rise to a challenge.

*The Author is teacher of patternmaking and foundry practice at the David Dale College, Glasgow.

Competitive Position of the Industry

Sound training is also of importance to the foundry industry as a whole, as it is daily facing competition from other applications, *e.g.*, fabrication and press forging. It is therefore imperative that the foundry industry shall remain at top efficiency and indeed widen its spheres of application. Finally, training is essential to the country's economy. If the country is to maintain its high living standards, more and more orders must be obtained in foreign markets, and it should be remembered that in this "shrinking" world, firms in countries five or six thousand miles away are nowadays as much to be reckoned competitors as those close at hand.

Training then is important as it improves technical knowledge and skill, but it should be remembered that men who are clever at their jobs may be lacking in a sense of responsibility, they may be dishonest, or have no respect for reasonable authority. The result is that their knowledge and

FIG. 1.—*The David Dale College foundry is very congested, but space is well utilized. Box-parts are 12 by 9 by 3 in. and Mansfield sands are used; castings are poured in a proprietary type of low-melting-point alloy. The sand-storage bin, the pot for melting lead alloy, the coreoven and the 12-lb capacity melting furnace for aluminium can also be seen.*

Correspondence

To the Editor of the FOUNDRY TRADE JOURNAL

BRAKE-DRUM PROBLEM

SIR,—As manufacturers of grey and high-duty iron castings for automobiles, our range of products includes cylinder-blocks, -heads, flywheels, brake-drums, inlet and exhaust manifolds for passenger cars.

We are at present having heavy rejections—due to microporosity of the brake-drums. The rejection percentage in the foundry is below 5 per cent., but we find that up to 50 per cent. of the castings are at present rejected in the machine-shop, due to fine porosity which is found in one or two spots on the braking surface of the drum. The porosity is found in the final operation of polishing of the braking surface. It appears in the form of specks at the position shown in Fig. 1. Sometimes, a considerable number of specks are present, but many of the castings are found to have only very few specks, though sufficient to incur rejection of the component. The illustration shows the section of the mould, the major dimensions, the gating system (dimensions quoted in Table 1), and also the appearance of the porosity which we are at present experiencing.

The brake-drums are moulded in greensand, the cope being made in a moulding box 6-in. deep, the drag being made in a moulding box either 6- or 4-in. deep. Moulds are made on a jolt/squeeze, pin-lift machine, pressure of air being 80 lb. per sq. in.; the sand employed is the synthetic type with 4 to 4.5 per cent. moisture, 60 to 80 per cent. permeability and 10 to 12 lb. per sq. in. strength. The composition of the metal used is: Total carbon 3.1 to 3.2, silicon 2.0 to 2.2, phosphorus 0.2 to 0.3, and manganese above 0.6 per cent. Brinell hardness is between 210 to 240 and the metal is poured at about 1,450 deg. C., pouring time being 6 to 7 sec. All metal, sand and moulding operations are being controlled.

We have tried to bring down the Carbon Equivalent, but the results are not satisfactory, the microporosity still persisting. We have not yet attempted any change in the gating system, as we know that it is a usual gating system adopted for brake-drums.

We would like to receive comments from your readers and suggestions how to improve our practice, and hope the matter can be treated with some urgency.—Yours, etc.

"DRUMMER."

TABLE 1.—*Brake-drum Dimensions and Sizes of Running Systems Employed (all in inches) (See Fig. 1).*

Drum Size	A	B	C	D	Sprue (D)	Runner (R) (x)	(y)	(z)	Ingate (e)	(f)	Number of Ingates
Large (a)	7⅛	⅞	¼	2⅜	⅝ min. by 6	⅜	½	1	1¼	¼	Six
Small (b)	6⅛	⅝	¼	2⅜	⅝ min. by 6	⅜	½	⅝	⅜	⅜	Eight

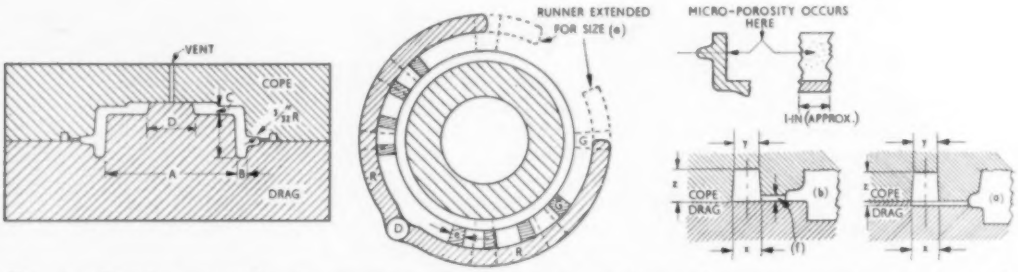


FIG. 1.—*Sketches of brake drums and the moulds and running systems at present used for their production (the broken lines indicate the running system for the larger—type (a)—brake drum). The location of defects is also shown. (See Table 1 for dimensions.)*

British/East German Trade Increase

Britain's import/export trade with East Germany rose by more than £2,000,000 in the first seven months of 1961 compared with the same period in 1960, and more than £5,000,000 compared with the first seven months of 1959. According to figures published by the Board of Trade, British imports from East Germany at July 31, 1961, totalled £4,464,542 compared with £3,962,638 in 1960 and £2,853,426 in 1959. Exports to East Germany totalled £5,168,163 compared with £4,298,596 in 1960 and £1,667,569 in 1959. Total British/East German trade (including re-exports) for the first seven months of this year came to £11,192,648 compared with £8,706,057 in 1960 and £5,090,220 in 1959.

BISRA Research Section Renamed

In recognition of the steady growth in the scope of its activities over recent years, the computer applications section of the Operational Research Department of the British Iron & Steel Research Association has now been renamed the systems evaluation section. The duties of the new section, which will be headed by Mr. D. H. Kelley, B.SC., will be to carry out operational research investigations into the automation of large-scale systems. The immediate programme will be to study the automatic production planning and scheduling of various kinds of steelworks, and to investigate the information requirements of steelworks management.

Technical Education of Foundry Apprentices

*By M. Callaghan**

After first stressing the importance of having well-trained personnel in the foundry industry, the Author deals briefly with the training centres and associations which help towards filling this need, and then deals fully with the work done at the David Dale College, Glasgow. How a college foundry can be set up is described and the training given at the College in the subjects of foundry practice and patternmaking is outlined. The account should help foundry and educational groups in this and overseas countries in formulating plans for establishing or enlarging their own foundry colleges. The article is especially appropriate at this time of year, when many young people are enrolling for the new session at technical schools and colleges.

Well-trained personnel are essential in every branch of the foundry industry from labourers to the chief chemist. This is because the production of a good casting could hang on whether or not any one of them really knows his job. In the foundry industry, it is not a case of one man, one product, but of many men contributing to the making of any one casting. It follows that a poor effort by one man can spoil the good efforts of others. Being well trained for one's share of foundrywork is therefore essential in four respects. First, to the individual, because being properly trained should give him confidence, a sense of security, and an interest in the work he is doing, because he can do it well. It is important to the firm also, because well-trained staff can be trusted to do a good job and so their high executives can be relieved of some of the worries. Moreover, when they possess well-trained personnel, firms can accept orders for difficult-to-make castings—and these seem to be increasing—because they can be confident that they have staff who can rise to a challenge.

*The Author is teacher of patternmaking and foundry practice at the David Dale College, Glasgow.

Competitive Position of the Industry

Sound training is also of importance to the foundry industry as a whole, as it is daily facing competition from other applications, *e.g.*, fabrication and press forging. It is therefore imperative that the foundry industry shall remain at top efficiency and indeed widen its spheres of application. Finally, training is essential to the country's economy. If the country is to maintain its high living standards, more and more orders must be obtained in foreign markets, and it should be remembered that in this "shrinking" world, firms in countries five or six thousand miles away are nowadays as much to be reckoned competitors as those close at hand.

Training then is important as it improves technical knowledge and skill, but it should be remembered that men who are clever at their jobs may be lacking in a sense of responsibility, they may be dishonest, or have no respect for reasonable authority. The result is that their knowledge and

FIG. 1.—*The David Dale College foundry is very congested, but space is well utilized. Box-parts are* 12 *by* 9 *by* 3 *in. and Mansfield sands are used; castings are poured in a proprietary type of low-melting-point alloy. The sand-storage bin, the pot for melting lead alloy, the coreoven and the* 12-*lb capacity melting furnace for aluminium can also be seen.*

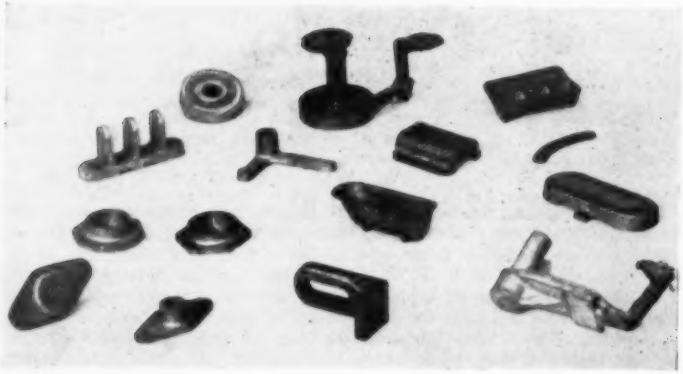


FIG. 2.—*Typical castings made by pre-apprentice students. Some moulds are cored but some patterns leave their own core.*

skill may not be fully directed towards the four ends already mentioned and then the standard of citizenship falls. Therefore another essential of training is the forming and/or building up of a strong character, and it is in technical colleges where education and training can meet on neutral ground.

All the major governments in the world are agreed—to varying degrees—that technical colleges should play a part in the development of highly-trained men, and to-day governments are spending millions of pounds to this end. The United Kingdom authorities are strongly supporting the advancement of knowledge and skill, and ideas on training have often been expounded by lecturers at technical meetings held all over the world. In the UK, the foundry industry has set up the National Foundry Craft Training Centre at West Bromwich; the industry is also served by the National Foundry College at Wolverhampton; the Meehanite group of companies have their own Craft Training Centre at Derby, to mention but a few. In addition, the Council of Ironfoundry Associations arranges UK participation in an annual European Apprentice Competition, the standard of which, though high, does much to encourage foundry training. The foundry industry, mainly through the Institute of British Foundrymen (and other associations) provides useful literature for the use of teachers of patternmaking and foundry practice. The industry also recommends that member firms send their apprentices to technical colleges and supports various schemes for training and education. Thus, as can be seen, the foundry industry is doing much, but could it do still more?

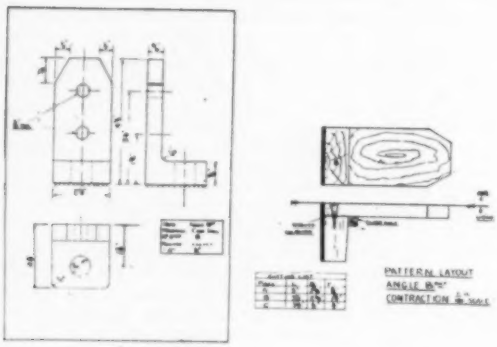


FIG. 3.—*A student is provided with a drawing (left) of a casting. This drawing is made to standard engineering requirements showing bolt-holes, machined surfaces, etc. On the right is a pattern layout prepared by the student showing joint-line, taper, machining allowance and method of contraction; small bolt-holes are left to be drilled. The layout drawing is made to contraction scale. The cutting list enables a student to plan a rough timber stock demand and think in three dimensions.*

Unfortunately, realization of the usefulness of technical education wanes to a varying degree when it reaches individual firm and apprentice level. Foundries would like to have well-trained personnel and apprentices, too, need to be well trained, but

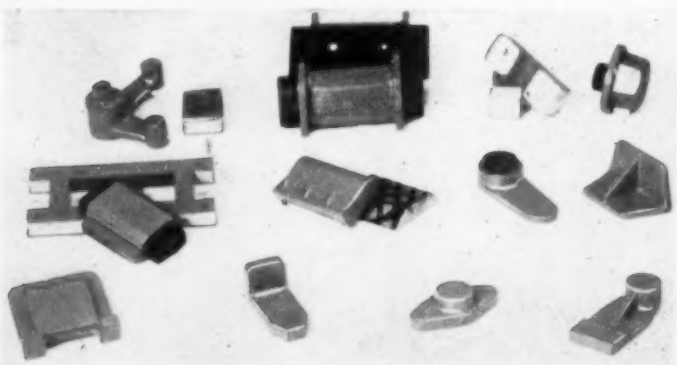


FIG. 4.—*Further selection of pre-apprentice patterns; features exhibited include a construction problem, a half-lap joint, split patterns and coreboxes, a shell pattern and follow board and a hexagonal nut (made cope-box first) with a loose print.*

they are not sure that attendance at technical colleges on one day per week is part of the way of doing it. As a result, the training of apprentice tradesmen, such as coremakers, moulders, pattern-makers, technicians, weight estimators, etc., consists of a "mixed bag" of ideas and methods, whilst education is practically nil. That at least is the general position at present.

Training at David Dale College

Following the review which follows of the work done at the David Dale College, in Glasgow, specifically in relation to foundry practice and

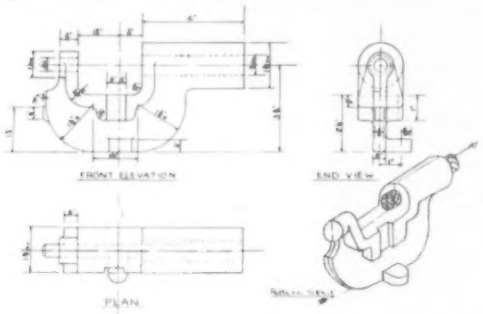


FIG. 5.—*Guide bracket for first-year patternmaking students. Of the three views shown, two would be copied in workshop drawing, the end elevation being "originated" in addition. The student would consider making the pattern and draw an isometric view showing coreprints, parting line, etc. For all students, most of the working drawings show two views. (Time allowed, 1¼ hours.)*

patternmaking, it is hoped that the methods and ideas put forward will be judged, criticized and improved upon by those in other spheres who are responsible for the training of personnel, and thus provide useful stimulus to other foundry and educational groups.

Three types of students are taught at the College: (1) pre-apprentices; (2) day-release apprentices, and (3) evening-class apprentices. Dealing first with pre-apprentices, boys join the College on leaving school at 15 and attend a full-time engineering Course lasting 32 weeks. During the last session, there were 180 enrolled. The Course consists of practical work in seven trades, *viz.*, moulding, patternmaking, sheetmetal work, fitting, machine-shop work, blacksmithing and electrical installation, the time spent in each section being one month or 120 working hours done consecutively. The remainder of the Course covers mathematics, science and drawing and takes the students to the J2 level of the National Certificate of Mechanical Engineering. English social studies and physical training also form part of the Course. For the purpose of this article, however, only subjects of foundry practice and patternmaking will be dealt with.

Foundry

The David Dale College has a small foundry of about 450 sq. ft. area and a bench capacity for 12 students. Other equipment installed includes a small 12-lb. capacity aluminium melting furnace, a coreoven, sand-storage bin and a pot for melting lead alloy. The students use a runner system appropriate to each separate job, and make and stove their own cores in oil sand. (Thanks here are due to Auld & Company who keep the College well supplied with this sand.) Each job carried

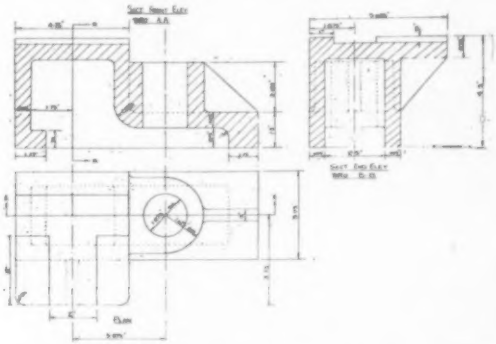


FIG. 6.—*Pedestal bracket for patternmaking, stage II. Of the three views shown, only one (the plan) would be copied from the working drawing, both sectional views being "orginated." The dimensions in decimals of an inch would be converted from vulgar fractions as shown in working drawings and of course the position of dimensions would, in most cases, be originated too. (Time allowed, 1¾ hours.)*

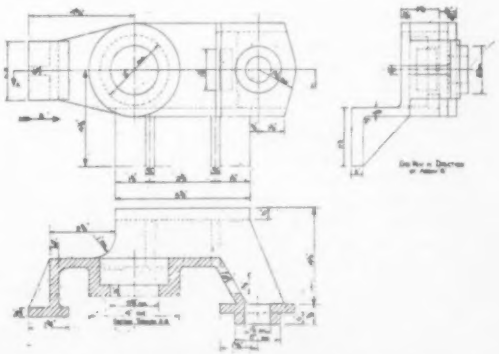


FIG. 7.—*Patternmaking stage II: In this drawing, all views would be different from those shown in working drawing, e.g., the front elevation was the plan in the working drawing. The time allowed is 1¾ hours, including dimensioning.*

out by the students takes approximately 2½ hours and includes dealing with such common moulding

Apprentice Training

problems as blind draws, loose-pieces, block cores, split patterns, etc. In all, each student taking the course makes about 12 castings.

In addition to the practical work, short talks are given (often supported by film or film-strip shows) to explain the importance of the foundry industry, the advantages and disadvantages of making items by casting, common uses for cast metals, machine moulding, and die-casting, to mention but a few of the subjects included.

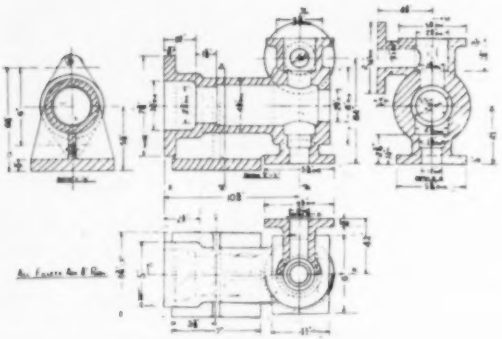


FIG. 8.—*Patternmaking, stage IV: This is an example of double-angle projection. The student has reached a very high standard of fast drawing and is well prepared to tackle the City & Guilds final examination in drawings. It will be noticed that all the drawings are only concerned with the casting.*

Patternshop

The College also has a patternshop, which covers approximately the same area as the foundry and is equipped with standard machine-tools; this department has a capacity for 16 students. The timber used for patterns is yellow pine and Jelutong and when finished, the patterns are used in the College's own foundry, often by the same students who made the pattern. Each student usually makes four patterns and two coreboxes during the course. As in the course on foundry practice, short lectures are given by the tutors which explain the rôle of patternmaking in the industry, give detailed explanations of the selection of pattern-making materials and processes and show examples of stucco, metal and plastic patterns.

Day-release Apprentices

Dealing next with the position of day-release apprentices at the College, each course is of 42 weeks' duration at 6½ hours per week, *i.e.* 273 hours per session. At present the number enrolled is 87, 56 day-release students taking patternmaking and 31 foundry practice. (Table 1.) Patternmaking is taught to first-, second-, third- and fourth-year students, up to City and Guilds Ordinary and Advanced Level, and foundry practice is taught to first-, second- and third-year students, *i.e.* City and Guilds Ordinary Level. The subjects covered by the Course including drawing, calculations, practical work, technology, and English and social studies are taught to first-year students only. Patternmaking is divided into sections which cover drawing, geometry, calculations, science and heat, technology and practical work.

In the section on drawing, the aim is not necessarily to teach students how to make drawings, but

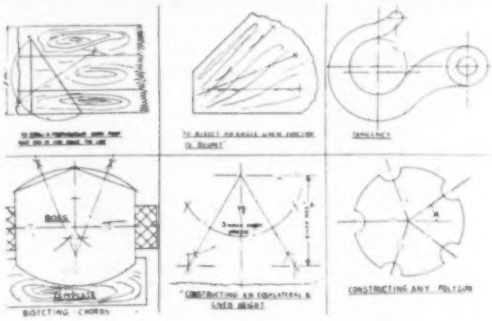


FIG. 9.—*Six examples of plane geometrical constructions. Such work is completed at the end of the second year of the Course and two problems on this topic, in addition to one on engineering drawing, are demanded for the examination standard.*

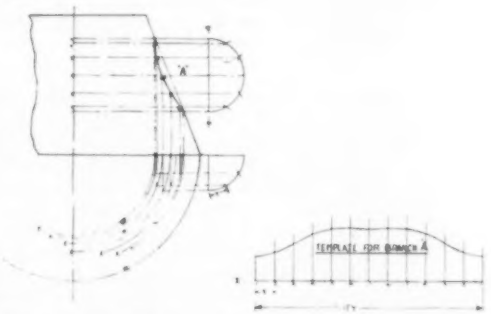


FIG. 10.—*Example of "solid" geometry: The senior students are taught solid geometry and its practical applications, e.g., fitting bosses and brackets loosely to cylindrical, conical and spherical shapes. This is done by preparing a template which is wrapped around the branch and the curve of intersection marked out, providing an accurate seating for branches. To be of practical value, such work must be done rapidly and—at examination level—20 min. is the time allowed for these examples.*

to teach them how to read drawings. The student starts with simple work first, *e.g.*, copying two views of a job and originating only one, to drawing

three or four views of fairly complicated components. All forms of plane geometry which have an application in patternmaking are taught, *e.g.*, marking out of curves, erecting perpendiculars and making angles, when work is outside the limits of standard tools. Third- and fourth-year students are taught how to plot the curve of intersection and how to make templates to form the true lines of joints of cylindrical and conical shape—this has an application when a part has to be fitted loose to a pattern for moulding or alteration purposes. About 35 drawings are made by each student per

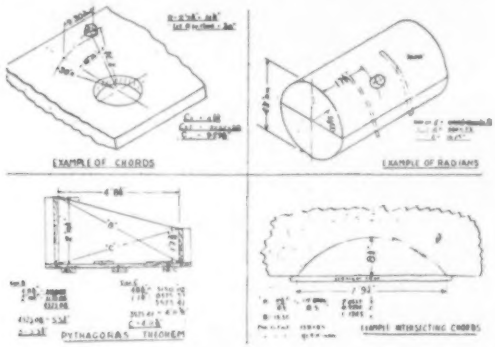


FIG. 11.—*Miscellaneous examples of practical applications for mathematical theorems to provide more accurate dimensions than is possible by ordinary indirect means or by using instruments. Calculations are made on a "ready reckoner" basis and all the workings necessary are shown in each section. The illustration poses the question: "Why use chord sticks and large clumsy wooden squares when accurate "mathematical tools" can be applied easily?"*

session and the final examination consists of three questions on drawings to be completed in 1¾ hours. In the section on calculations, the aim of the College is to show the student that arithmetic and simple mathematics are useful "tools" of his trade. The course takes in vulgar and decimal

TABLE 1.—*Typical Attendance Roll for "Foundry" Classes at David Dale College.*

Day-release Apprentices:

Year.	Patternmaking. Number enrolled.	Patternmaking. Hours per session.	Foundry practice. Number enrolled.	Foundry practice. Hours per session.
First ..	14	280	20	280
Second ..	18	273	5	273
Third ..	13	273	6	273
Fourth ..	11	273	—	—

Evening-class Apprentices:

Year.	Patternmaking. Number enrolled.	Patternmaking. Hours per session.	Foundry practice. Number enrolled.	Foundry practice. Hours per session.
First ..	7	104	4	104
Second ..	8	156	2	104
Third ..	2	156	3	104
Fourth ..	2	156	3	104

Note: (1) Day-release attendances are substantially larger than for evening classes; (2) relatively poor attendances of foundry practice apprentices in both sections; (3) attendance of foundry practice students was only 2 per cent of the College's total roll of 1,800, and lower still when bearing in mind attendances of 8,000 at the local College of Engineering.

fractions, metric systems (and conversion one to the other), percentages and ratios as applied to foundrywork, and various other calculations such as those involved in comparing the weight of patterns and castings made from them in different metals, the calculation of the amount of weight saved by hollowing out the underside of patterns or patternplates, and the estimation of weights of castings.*

A laboratory is at the disposal of students at the College and such work as finding co-efficients of linear expansion, etc., are taught mainly by experiment. Calculations, general science and heat are covered in a common examination. Lectures are also given to the students and notes are taken on such subjects as patternmaking materials and processes, *e.g.*, the making of particular jobs—from the use of sweeps for loam work to plate patterns for machine moulding. The student taking the course in patternmaking makes from six patterns

* See "Calculation of Casting Weights" by M. Callaghan, JOURNAL December 29, 1960. p. 815.

FIG. 12.—*Patternmaking, stage II: Section of a class of students in the mechanics laboratory are verifying calculations by experiments. The students are working on "beam laws." The weight of beam and the loaded weights will have a reaction at each end of the "beam," which is measured by scales. By loading the beam at set distances and by weights of set values, the resulting "moments" can be calculated and verified by experiment. Such procedure proves the formulæ and stimulates confidence.*

FIG. 13.—*Examples of practical patternmaking work by students. They demonstrate lathe turning between centres, face-plate turning, a shell pattern with a follow-board, a double-flanged connection (small flanges fitted with loose-pieces), and a lever pattern with coreboxes.*

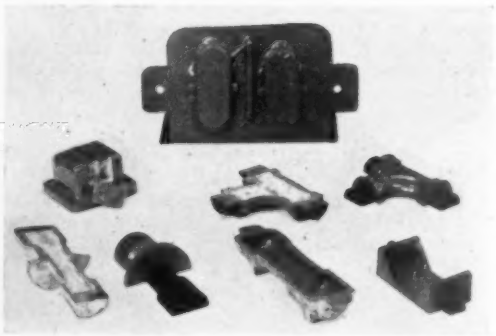


FIG. 14.—*Further examples of patternmaking—in plastics—for fourth-year students. This type of patternmaking is not in the syllabus, but following C & G final examinations, the College has a more-flexible timetable.*

Shown are a double-sided patternplate (laminated) with steel dowel-hole bosses cast in; the three-way pipe is hollowed out and the corebox for the balancing core is also laminated and has a sawblade cast in on edge to increase wear-resistance. The small support bracket with a tail print is cast solid, using a hardened slate filler.

and coreboxes in his earlier years of training to three or four intricate patterns in the later years. The final-year apprentice makes one pattern and corebox in epoxy resin.

Foundry Practice

Drawing also plays an important part in the Course on foundry practice and engineering drawing is taught to apprentices in first, second and third years, the purpose of the tutors again being to teach students how to read drawings and not necessarily how to draw. As in the patternmaking Courses, all the exercises in connection with drawing deal simply with the casting. The aim is to assist moulders to read drawings in the belief that this should be useful when coreing-up jobs, checking wall-thicknesses, and giving assistance to the patternmaker in deciding the method of moulding while the job is still only "on paper." Drawing is also done of sections taken through a mould and these show mould joints, cores and chills in place, etc. Forms of plane geometry which have an application to moulding problems are also taught, *e.g.*, the marking-out of core-irons, bedding-in of bosses, etc. Sections of the Courses deal with the design of castings and of moulding boxes. In the former, such things as recommended alterations to the design of a casting which may have a bearing on solidification, contraction, or moulding problems, etc., are put forward. The design of individual moulding boxes for special purposes seems to be increasing in foundries and hence the general principles of design are explained to the students and examples drawn. In the Foundry-practice Course, some 30 drawings are made per session.

Other subjects covered in the Course on foundry practice include calculations (fractions, decimals, metric system), the use of averages is taught (with a view to promoting rapid and confident adoption); ratios, proportions and percentages are covered as applied sand mixes, metal mixes, casting yield, etc.; areas—as applied to blast pressures, diameters of furnaces and so on—are also taught. Work involving chemistry and heat mechanics is mainly

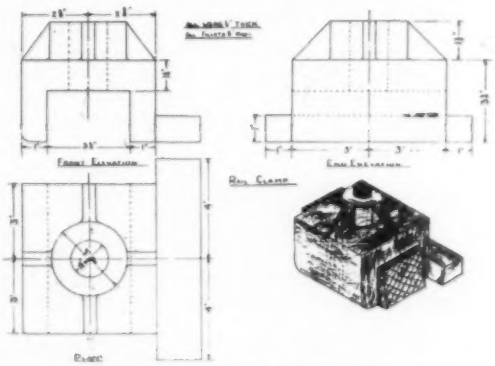


FIG. 15(*a*).—*Example from first-year foundry practice (drawing exercise). Two views of this drawing are copied, the end elevation being originated.*

After making the drawing, the student plans and draws an isometric view of the pattern he would require, showing the parting line and other necessities such as coreprints and the provision of liberal taper on the sides of the toes. (Time allowed, 12 hours.)

of an experimental nature and carried out in the College's laboratory. Here, oxygen, hydrogen, nitrogen and their effects on combustion, oxidization, reduction and corrosion are considered, in addition to elements such as carbon, silicon, manganese, phosphorus and sulphur and their effects on iron and steel. Effects of heat on metal and

sands, casting faults caused by these effects and methods of dealing with them are also taught to the students.

Practical Side

On the practical side of foundry practice, the small foundry (used by pre-apprentices) is also used by the day-release students. Here castings are made in aluminium, LM4 and LM6 alloys. In addition to remelting their own castings, virgin-metal and copper and silicon hardeners are introduced, the students working out percentage requirements to produce LM4 and LM6 alloys. Equipment is also available for performing mechanical tests on sands. At the end of three years, students of foundry practice should be qualified to sit for the City and Guilds Ordinary level examination. On the other hand, the students of patternmaking can continue their studies for a further year and then take the City and Guilds Advanced examination. The David Dale College has an excellent record in these examinations, particularly in patternmaking, and the College's average number of passes has always been well above the national average.

Future Educational Requirements

The greatest need in the field of education is for more-advanced study and a wider distribution of knowledge. Throughout the country, there is only one course of technical training in foundry practice—the City and Guilds Courses, which were established in 1932. Since that date, however, very-rapid technical developments in the foundry industry have produced a group of specialists called technicians, *i.e.*, production- and method planners, weight-and-costing estimators, sand controllers, etc. The Author's view is that adequate training facilities are not available for these and technical level in the foundry industry is not functioning properly as a consequence.

The industry's technicians need to be trained from the outset, instead of picking out the bright third- and fourth-year students and sending them to a planning department where for a few years they "try to find their feet." When their time is out, they are neither the good moulders they might have been nor the best technicians. What is required would seem to be a higher—though narrower—course of foundry studies than catered for by the City and Guilds syllabus. This might be called a National Certificate Course in Foundry Practice where sands, metal melting and casting techniques would be studied more closely, and where production planning, weight estimating, etc., would be tackled in a more deliberate way and to a specialist level. The Council of Ironfoundry Associations is pressing for such a course and urging all technical bodies in the industry to get together and see that such a scheme is put into practice with the least possible delay.

Meanwhile, in order to meet the immediate needs of the industry, many colleges in England are offering short specialist courses of eight to 10 evenings' duration. To the Author's knowledge, one such course has been held in Scotland, though many more are needed. Last session, the Author's College was asked to include a short six-week course on the subject of plastic patternmaking, the course being arranged for journeymen, with no examinations and no enforced "swotting." A total of 120 enrolments were made, 94 took the actual course and two teachers were kept busy beyond the normal evening-class session, so that the course was forced to overflow into the present session to cater for the enrolment. This proves

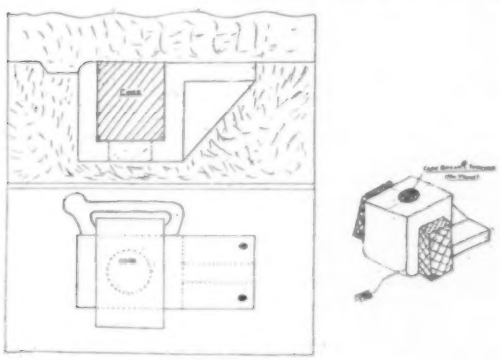


FIG. 15(*b*).—*Second example from first-year foundry practice (drawing): From an engineering drawing, the student prepares two views of sections through the mould showing methods of moulding, coring and pouring. In addition, he makes a free-hand isometric sketch of the pattern he would require.*

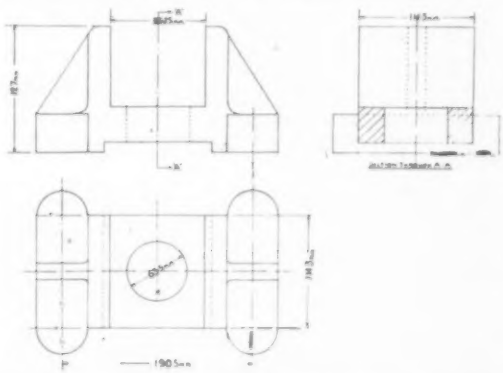


FIG. 16.—*Foundry practice second year (drawing): Of the three views shown, only the front elevation would be copied, the plan and sectional end elevation being originated.*

Dimensions in millimetres would be converted from vulgar fractions from the working drawing, the idea being to make a student really familiar with the metric system—which may be adopted in this country in the not-too-distant future.

Apprentice Training

that men will come back to evening school from industry if the subject is of specialist value to them and if the course is on informal lines. The foundry industry should encourage such courses and promote them.

Liaison with Industry

Another consideration for the future must be closer contact between colleges and the foundry industry. A famous foundryman described the purpose of the industry as " the rapid production of sound castings at an economic price." It is the aim of technical colleges to contribute substantially to this end, but in addition, colleges must try to make students into good citizens as well as good tradesmen. Teachers in colleges must maintain industrial contact and try to keep abreast of developments in the industry by reading technical literature, by attending technical meetings and by making as many visits to foundries as time permits.

Another important consideration for the future is to tackle the problems of casting design where it should be dealt with, namely, in technical courses

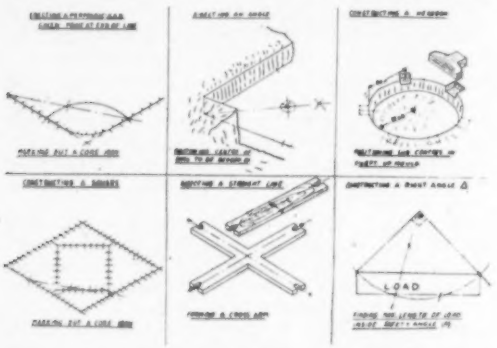
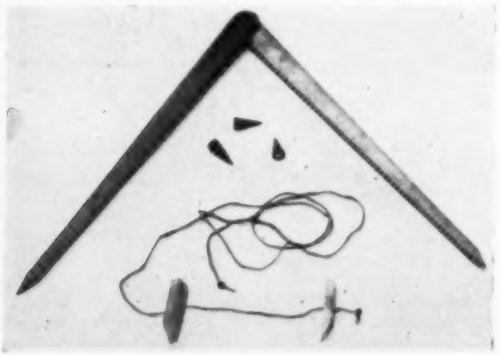


FIG. 17 (*a*).—*Example of first-year plane geometry which has considerable application in moulding practice. Equipment is simple and displayed for students to examine.*

Time and effort can be saved by applying such principles in the moulding shop and greater accuracy results. For example, large coreboxes when turned over on to a core-iron bed present a handling problem and the stamp is of course on the opposite hand. Speed in application is essential and time allowed is 10 min. for each.*

*See Simple Geometry in the Foundry by M. Callaghan, JOURNAL, November 26, 1959, p. 519.

FIG. 17 (*b*).—*Equipment used for the exercises shown in Fig.* 17 (*a*). *The compasses have about 24-in. legs, the string trammels are used for scribing outside the scope of the compasses and the conical centrepieces are pressed into the sand to form supports for compass or trammel points.*



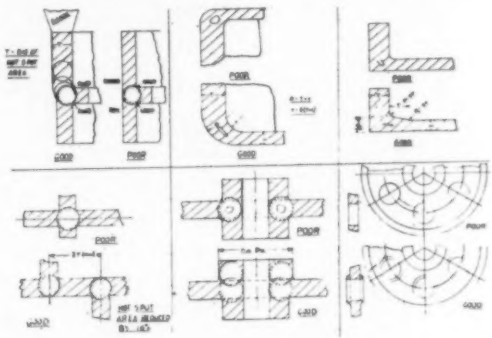


FIG. 18.—*Foundry practice third year (casting design): The students are given four periods on this work in the hope that they will be able to understand reasons for defects and can use this information to submit recommendations for improvement when or where desirable.*

for young designers. Much has been said in the past about this problem and plenty of sound literature is available on the subject, but in the Author's opinion, casting design should be taught to students in the Higher National Course for Mechanical Engineers. In the future, production of castings will be affected by (*a*) greater mechanization; (*b*) improvement in raw materials, adoption of new ones and the economic use of such materials; (*c*) more-exacting chemical and mechanical control of the properties of castings; (*d*) increased complexity of casting shapes; (*e*) improvement in dimensional accuracy; (*f*) improvement in surface finish, and (*g*) reduction in fettling —to save both time and material. These advances will mean that better-trained technicians and craftsmen, as well as designers, will be required who are well aware of the industry's problems. Technical colleges have therefore an increasingly-important part to play in the future, because it is insufficient to *demand* knowledge and skill, they have to be taught.

To meet these changes, the David Dale College will be allocating 1,000 sq. ft. of its new extension (out of a total of 9,000 sq. ft.) to accommodate a new foundry. Finally, in the more distant future, it is hoped that Scotland will have its own Foundry

Craft Training Centre on the same lines as that at West Bromwich or Derby. The foundry industry is, by its nature, dependent on skilled craftsmen, and regularly-organized practical training, such as dealing with large bedding-in work, deep "draw-backs" requiring the stamping and making of core-irons and moulding tackle, use of three- or four-part boxes, etc., will mean two or three days on a particular job, not the 1½ hours which is allowed in technical colleges.

Also, it is hoped that the future will bring a change in the apprenticeship scheme. "Serving your time" is the common expression, and time alone seems to be the primary factor at the present day which decides whether an apprentice will pass from one stage to another and finally to journeyman status. One student can be careless and lazy, another methodical and clever, but both must "advance" together in the existing set up. It is only technical colleges which can set standards of knowledge and skill and do not allow an apprentice to pass on to a higher year unless he has proved himself by examination. Yet, it is hoped that in the future this commonsense principle will be adopted by industry also.

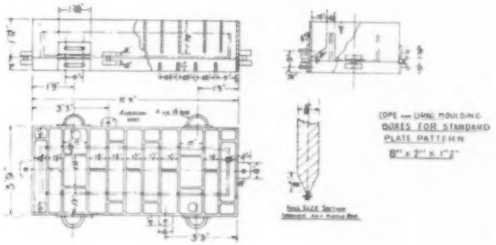


FIG. 19.—*Foundry practice third year (moulding-box design): The salient features of cast box design and taught, for example, metal thickness ¼ in.; ribs of pointed section and clearing pattern by 1 in.; a 3-in. sand margin around sides of box; crossbars not intersecting (about 8-in. apart).*

Advantages of such designs include saving of space, saving of sand reduced ramming time, elimination of hangers, as the ribs in the cope support the sand.

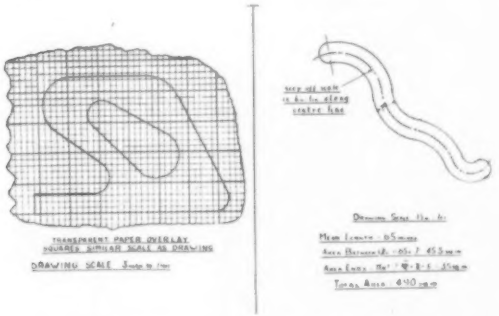


FIG. 20.—*Example of estimating weights of castings from a drawing. Illustrated is the use of transparent overlays which provide a simple means of assessing areas with fair accuracy.*

The heavy lines group the squares into 25's and 100's, thus reducing the time for assessment. In this way also a curved section can be assessed for length by stepping off along the centre-line according to the scale of the drawing.

FIG. 21.—*Third-year foundry practice students carrying out a laboratory test. They are told that in the CO_2 Process, sodium-silicate is contained in the sand and on the injection of carbon-dioxide, hardening takes place. In the laboratory, the students are heating crystalline sodium-carbonate to show that although apparently dry, it does contain water in a similar way to moulds in the CO_2 Process—indicating the advantage of flame drying or blacking.*

FIG. 22.—*Examples of foundry practical work performed by students. The castings were made mostly in 11 by 12 by 4 by 3 in. box-parts, some three parted, others with loose-flanges drawn in and some incorporating deep joints, block cores, feeders or multiple cores as required.*

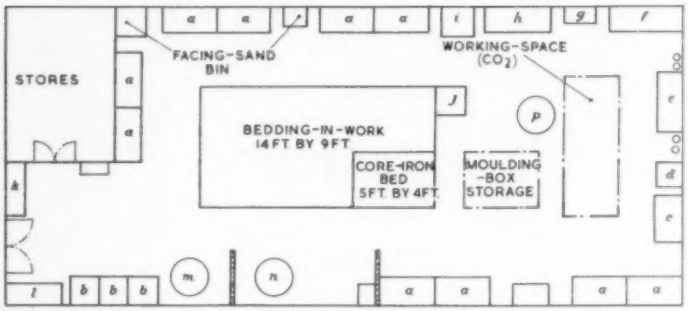


FIG. 23.—*Layout of proposed new foundry extension for the David Dale College. Supplementary portable equipment such as sand aerators, core trolleys and the like is not shown.*

Key: (*a*) Moulding benches; (*b*) bins for unprepared sand; (*c*) dressing bench (protected); (*d*) metal-cutting bandsaw; (*e*) work bench (CO_2); (*f*) unprepared sand (cores and CO_2); (*g*) coresand mixer; (*h*) core bench; (*i*) coreoven; (*j*) pin-lift machine; (*k*) coat cupboard; (*l*) air-compressor (connections to benches, rammers and chisels); (*m*) pan mill, and (*n*) 100-lb. capacity gas-fired tilter furnace.

In conclusion, when dealing with the subject of technical education and apprentice training, such things as recruitment of apprentices, discipline, teacher/student relationship, provision of instruments and equipment, award of bonuses for attendance as well as for passing examinations are all factors to be borne in mind.

Acknowledgments

The Author acknowledges assistance given to him by Mr. Cunningham (head of engineering department), Mr. Guidi (English department) and Mr. Lennox, all from the David Dale College, for helpful advice in the preparation of this article.

Candid Advice to British Exporters

British exporters have a "take it or leave it" attitude, said Mr. Arne Lundberg, president of the Swedish Chamber of Commerce, speaking at a Scottish-Swedish trade meeting in Edinburgh on Monday. "If a Swedish customer wishes an amendment made to a machine the Germans will send a man to discuss it on the spot and rush it in the shortest time possible," he said. The same reaction had not been shown by British companies. "It may be that the British believe that their equipment is good enough for the purpose, and that alterations to it are not necessary or possible."

Mr. Lundberg told the meeting, which was organized by the Scottish Council (Development and Industry) in co-operation with the British-Swedish Chamber of Commerce, that it was important that British firms should be prepared to meet any special wishes of customers. Sweden was one of the most difficult and competitive markets in the world, and any Scottish businessman who tried to export to Sweden half-heartedly did more harm than good, not only to his own firm but to the whole of the Scottish export effort.

Too many Swedish businessmen had to write to Britain to get price quotations, he said. Few British firms tried to find out if their prices were right, and British salesmanship could be more aggressive. The "take it or leave it" attitude was not an export market attitude. Mr. Lundberg also stressed the importance of delivery dates being adhered to.

In a reference to shipbuilding, he said: "The confidence of the other seafaring nations of Europe in British shipbuilding has been shaken, not because of loss of quality but because of repeated strikes and demarcation disputes. It takes twice the time to build in Britain as it does in Sweden."

At a lunch later, Lord Craigton, Minister of State, Scottish Office, said the result of the first year of closer partnership between the UK and Sweden had been striking. Swedish exports to the UK for the year ended June, 1961, were worth £171,000,000, a 16 per cent. increase over the previous year, and our exports to Sweden were worth £135,000,000, a rise of nearly 9 per cent.

Pig-iron and Steel Production in August

Two reasons are put forward by the Iron and Steel Board in its monthly production statement published last week for the considerable drop in steel production in August. Compared with 1960, the decline, it is thought, was to a small extent due to holidays which tended to be taken rather later this year than last. A more important factor was probably a continuation or acceleration of the stock withdrawals which became apparent in the second quarter of 1961, whereas last year there was a stock increase.

Production of steel in August was at an average weekly rate of 338,400 tons, compared with 380,200 tons a week in July and with 422,900 tons a week in August, 1960. Pig-iron production last month was at a weekly average of 264,900 tons, compared with 276,600 tons in July, and with 291,400 tons in August, 1960. Latest pig-iron and steel output figures (in tons), with the corresponding 1960 returns, are shown in the following table:—

Period.	Pig-Iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1961—June ..	297,400	15,463,000	447,500	23,268,000
July	276,000	14,381,000	380,200	19,771,000
August ..	264,900	13,774,000	338,400	17,595,000
1st 8 months	296,200	15,400,000	440,800	22,923,000
1960—June ..	295,200	15,353,000	466,400	24,255,000
July	288,900	15,024,000	391,400	20,355,000
August ..	291,400	15,152,000	422,900	21,988,000
1st 8 months	299,600	15,578,000	459,000	23,870,000

Mr. MICHAEL J. THEAKSTON, formerly London manager of Robert Hudson, Limited, manufacturers of light railway equipment has been appointed export sales manager based at head office, Leeds. He succeeds Mr. R. A. Hudson, who has taken up specialist duties in the company's manufacturing division. The new London manager is Mr. BERNARD A. VICKERY, formerly sales representative in that area. Mr. FRANCIS THEAKSTON will continue as consultant director at London office.

Does Safety Pay?

The annual 1961 statement of the chairman of the Iron Trades Employers' Insurance Association, Limited, indicated that, in contrast with previous years, a higher ratio of claims cost was anticipated for 1960. He stressed the need for both sides of industry to eliminate causes of accidents and to work safely. The general manager of the Association has since written the following note for the Council of Ironfoundry Associations:—

"When management initiates and implements a policy of ensuring safe-working conditions and safe-working practice, its primary consideration is protection of the life and limb of the worker and the elimination of the suffering that results from personal injury. However, it is right that this aim should find a powerful support and stimulus from the fact that safe working is also economic working.

"*Does safety pay?* A lifetime's experience of compensation problems for industrial injuries prompts the unhesitating answer 'Yes, undoubtedly it does.' From experience, too, one can say that, although much remains to be done before anything approaching a millenium is reached, there has been on the part of employers a steadily developing interest in industrial safety. This must not be taken to mean that the sole responsibility for industrial safety rests with the employer. Too often the injured party is the author of his own misfortune, and much of any works safety programme must be concerned with the education of the workpeople. Men must be taught to appreciate that all the expense and effort that the employer devotes to their protection is worth little without co-operation on the workers' part, stemming from their awareness of the risks and a determination to avoid them. With imagination, much may be done to awaken the workers' interest in safety—initial training; propaganda by safety poster, bulletin and wage-packet slip; worker representation on safety committees; suggestion schemes; departmental contests with a suitable trophy, and so on. The ambulance room can help, too, and a works doctor—quite apart from the benefit from his medical knowledge and skill—can bring a powerful influence to bear at a critical psychological moment when an injured man is most ready to appreciate what safe working can really mean; the lesson he has learned can teach much to his fellow workers.

"The cost to the employer of achieving as near perfection as possible in the guarding of plant and machinery, of ensuring safe access, of supplying adequate personal safety equipment and achieving safe-working conditions generally, is repaid in many ways; in disruption prevented, production maintained, better staff relations and—in hard cash—in reduced insurance premiums which follow a reduction in the number of payments made in compensation. Safety undoubtedly pays!"

Costs in the Courts

The Iron Trades Employers' Insurance Association, Limited, has also supplied details of the costs of some recent typical actions arising from injuries to foundrymen. Details of these follow, and show quite clearly how heavy can be the cost of awards and legal costs against which industry much insure.

PLAINTIFF, a moulder, pouring molten metal into a mould when some metal escaped from the moulding box. He sustained burns to both legs.

DEFENCE: Failure of the plaintiff to make the mould properly and to wear spats which were provided.

AWARD OF COURT: £305, after taking into account the finding of plaintiff's 50 per cent. contributory negligence.

PLAINTIFF'S COSTS: £425. DEFENDANT'S COSTS: £517.

* * *

PLAINTIFF fell from cupola bottom-plate to floor whilst adjusting control wheel, sustaining injuries to left wrist.

DEFENCE: Plaintiff failed to use ladder which was available to him.

AWARD OF COURT: £377, after taking into account the finding of plaintiff's 25 per cent. contributory negligence.

PLAINTIFF'S COSTS: £350. DEFENDANT'S COSTS: £256.

* * *

PLAINTIFF was transferring molten metal from one ladle to another when ladle was knocked over. Molten metal spread to a damp patch on floor where water had come through the roof and splashed, causing severe burns to face and body.

DEFENCE: Contributory negligence in failing properly to control the ladle, or to wear available goggles.

SETTLEMENT AT COURT: £5,000.

PLAINTIFF'S COSTS: £328. DEFENDANT'S COSTS: £220.

* * *

PLAINTIFF fell over a moulding box projecting into a gangway whilst carrying another box, sustaining minor injuries to one finger on each hand.

DEFENCE: Plaintiff failed to take reasonable care and in any event was responsible for the positioning of the moulding box over which he tripped.

CLAIM: £400.

AWARD OF COURT: £167.

PLAINTIFF'S COSTS: £100. DEFENDANT'S COSTS: £103.

* * *

PURSUER alleged that a moulding box moved on a roller conveyor due to a cracked roller and trapped his foot while standing on the roller conveyor. He suffered fracture of the toes.

DEFENCE: Denial that roller was cracked: contributory negligence of pursuer in standing on the roller conveyor contrary to instructions.

CLAIM: £2,000.

DEFENCE was successful but, as the action was brought with the assistance of legal aid, the defendant's were unable to recover their legal costs amounting to £497.

* * *

PLAINTIFF in attempting to separate parts of a moulding box, sustained a disc lesion injury to his back. Misalignment of the box pins had caused the two parts of the box to stick.

DEFENCE: Failure of plaintiff to take proper note of the pins and to ensure proper alignment.

JUDGMENT for plaintiff for £2,262.

PLAINTIFF'S COSTS: £334. DEFENDANT'S COSTS: £309.

Birmingham Engineering and Building Centre

A new "shop window" for Britain's engineering and building trades is to be opened next March at Broad Street, Birmingham. The £200,000 former Masonic Temple, in the heart of the city's civic and commercial community, is at present being converted into a comprehensive exhibition hall; rooms are being re-styled, and entrances and staircases remodelled in a £80,000 alteration scheme which will eventually make the headquarters for the Engineering and Building Centre. The new Centre is a direct descendant from the city's Iron and Coal Exchange which was founded in 1861 and flourished for 80 years. Its place was ultimately taken by the Birmingham Exchange and Engineering Centre in Stephenson Place which is now to move to the rebuilt premises and link with the building trade in the new project.

The new headquarters, occupying 37,000 sq. ft. of floor-space, will have on show a permanent, yet ever-changing, exhibition of the country's finest products, from door knobs to castings, tool steels and turbines, and the building will also provide facilities in two smaller halls for special short-term exhibitions.

In addition to exhibition facilities, there will be reading, writing and refreshment rooms, secretarial services, lecture halls, projection equipment, a catalogue library and an information service where visitors can discuss any aspect of business from finding work-contracts to locating the manufacturer of specific items. In addition, overseas visitors will be invited to use the Centre as their operational headquarters. The general manager of the Centre is Mr. A. J. Cox and the president, Mr. A. G. Banks. Commenting on the new Centre, Mr. Cox said the initial demand for space had been such that it had been decided to build a further extension immediately.

Foundry Practice Lectures

The Engineering Department (metallurgy section) of the Kingston Technical College, Fassett Road, Kingston-upon-Thames, is organizing a series of eight lectures on "Modern Foundry Techniques." The lectures will be given on Tuesday evenings at 7 p.m., commencing October 10, as follow:—(1) "Sand Casting—Light Alloys," by J. F. Clatworthy (of V. Moyle & Company, Limited) (2) "Gravity-die-casting," by W. W. Glick (of H. J. Maybrey & Company, Limited); (3) "Carbon-dioxide/Sodium-silicate Process," by H. S. Newton (of Distillers Company, Limited); (4) "Pressure-die-casting," by H. J. Sharp, PH.D., M.SC. (of Hoovers, Limited); (5) "Shell Moulding," by W. W. Glick; (6) "Investment Casting," by a member of the staff of Napier Aero Engine Company, Limited; (7) "Spheroidal-graphite Irons," by J. C. Morrison (of International Nickel Company (Mond), Limited), and (8) "Inspection of Castings," by S. L. Fry (of J. Stone & Company, Limited). The course is being organized by Mr. J. E. Cleverly, B.SC., F.I.M., and the fee is £1 2s. 6d. Full details and application forms are obtainable from the principal, Kingston Technical College.

A CONTRACT for the supply of 48-in. dia. bolted-gland spun-iron pipes and fittings for the Yardley & Tyburn main sewer has been awarded to Stanton and Staveley Sales, Limited, near Nottingham, by the Birmingham Tame and Rea District Drainage Board. The order is valued at approximately £176,000.

IPM National Conference

"Creative Industrial Enterprise"

The theme of this year's national conference of the Institute of Personnel Management, to be held in Edinburgh, October 5 to 7, will be "Creative Industrial Enterprise." On the Thursday, two one-day conferences, on "Selection of Managers" and "Company Wage Policy and Methods of Payment" will be held before the conference commences, in the evening, with a reception by the president of the Institute, Mr. J. M. F. Maslin, followed by the inaugural dinner at which the Lord and Lady Provost of Edinburgh will be present.

The morning of Friday, October 6, will be devoted to a plenary session on "Economic Aspects of Business Enterprise"; the presidential address, and the annual general meeting. In the afternoon, sectional meetings will discuss (*a*) wages, earnings and the working week; (*b*) recent developments in management training; (*c*) communications and joint consultation; (*d*) personnel management in the public services, and (*e*) responsibility in industry—management authority and workers' rights. On the Saturday, Professor James Drever, Professor of Psychology and Dean of the Faculty of Arts, Edinburgh University, will speak about the "Human Side of Enterprise," and the Rt. Hon. Lord Robens, chairman of the National Coal Board, will deal with "Social Aspects of Industry." The conference will close with luncheon at 1 p.m. Full details may be obtained from the conference secretary, IPM, 80, Fetter Lane, London, E.C.4.

Export Training Centre for Managers

An Export Training Centre for Managers, believed to be the first of its kind in Britain, was opened on September 7 at Sundridge Park, Kent. It has been set up by the existing Management Centre at Sundridge Park, to help Britain's export drive by providing comprehensive training facilities on a residential basis. (Sundridge Park Management Centre was established in 1955 as a non-profit making, educational trust by the management consultant firm of Personnel Administration, Limited).

The three-week courses to be held at the new Centre at regular intervals have been planned in consultation with an advisory panel set up by the Federation of British Industries and are intended for directors and senior sales executives concerned with the promotion of export business. Subjects covered will include selection of markets, market surveys, selling agents, price determination, control of overseas sales forces, and advertising. Special attention will be paid to Common Market trading. Full details may be obtained from the director of the Sundridge Park Management Centre, Bromley, Kent.

Latest Foundry Statistics

Steel Castings: The August *Bulletin* published jointly by the Iron and Steel Board and the British Iron and Steel Federation shows that the weekly average output of steel castings during July was estimated to be 5,500 tons. The estimated June production was 6,200 tons, whilst a year ago the figure was 4,400 tons. When a count was taken on July 8, there were 18,650 people on the payroll of the steelfoundry industry—a decrease of 150 as compared with June. A year ago 18,200 people were employed.

Improvement of Gating and Feeding for Ductile Iron*

By H. Otey Meriwether

In two earlier issues† of the JOURNAL consideration was given to the metallurgical processes that take place on the solidification of grey-iron castings. The special question of how s.-g. iron fits into this picture was also dealt with. The following article which offers a number of empirical formulæ—relating the practical variables involved—that have been arrived at in an attempt to solve the problems of feeding s.-g. iron castings might be said to be complementary to this study.

The development of ductile-iron metallurgy which has taken place during the past decade has necessitated the solution of another very complex problem—that of finding a method of gating and risering this new form of iron.

Grey Iron

A satisfactory system of gating and risering for grey iron has just been developed through a very extensive and prolonged project, and the important question was: Could this grey iron system be used for ductile iron? Since the gating and feeding system for grey iron had been developed at Lynchburg Foundry Company, along sound principles of fluid flow and heat transfer, it was believed that this system should quite logically serve as a foundation upon which to build a system for ductile iron.

Modified Approach

Ductile iron was known to possess certain characteristics which would necessitate the revision of established grey-iron gating and feeding formulae. It was known that shrinkage would be greater; it was also known that there would be more slag to trap in the gating system. There were also a number of characteristics which had not been determined: Would the fluidity be the same? Would the pouring time being used for grey iron be satisfactory when applied to ductile iron?

These and other questions could be answered only by gating and feeding certain ductile castings using the existing grey-iron system and evaluating the results. This was done, and the necessity for two revisions became obvious; as had been thought, the feeding calculations had to be modified, and the area-of-choke formula had to be changed. These changes were incorporated into the existing grey-iron gating and feeding system and, with a few additional refinements gained from experiences with ductile iron, have proved very satisfactory.

Calculations

An outline of the gating and feeding calculations governing the systems now being used for ductile iron at Lynchburg are as follow:—

(1) *Pouring Time*

The desired pouring time is calculated from the following formula:—

Pouring time $= K_1 \sqrt{\text{Casting weight}}$, where K_1 is a constant dependent upon the predominant

FIG. 1.—*Author H. Otey Meriwether examines a sectioned planetary driving-flange for porosity.*

* Reprinted from the *Iron Worker*, house organ of the Lynchburg Foundry Company, at Lynchburg, USA, where the Author is assistant works manager.

† Production of Sound Grey-iron Castings, by I. C. H. Hughes, M.Sc., A.I.M.—April 20, 491 to 497 and May 4, 563 to 567.

FIG. 2.—*Gating arrangement of a cable drum. Note the reduced runner size after passing the first ingate. The head employed on this casting is not gated through and must be 20 per cent. larger than a gated head.*

section-size of the casting. The value of K_1 at Lynchburg for ½ in. to 1 in. sections is 1.8, for thinner sections K_1 is 1.4 and for heavier sections it is 2.0. The constants have been determined through a thorough study of low-scrap-loss jobs and seem to be satisfactory.

(2) *Effective Sprue Height (ESH)*

The ESH represents the average ferrostatic-pressure acting on the gating system during the pouring of the casting and is calculated from the following formula:—

$$\text{Effective Sprue Height} = H - \frac{P^2}{2C}, \text{ where: } H = \text{height of metal above choke; } C = \text{height of casting; } P = \text{height of casting above choke.}$$

(3) *Calculation of Area of Choke*

The area of choke is calculated from the formula:—

$$\text{Area of Choke} = \frac{K_2 \times \text{Pouring weight}}{\text{Pouring time} \times \sqrt{ESH}}$$

where K_2 is a constant determined experimentally at Lynchburg to be 0.34. This constant compensates for the fluidity of the iron, the frictional loss through the gating system and the force of gravity. This constant had to be changed for ductile iron. A constant of 0.21 is used for grey iron at the Author's foundry.

(4) *Calculation of the Runner Size*

The runner size is calculated in two steps. First the pouring rate has to be calculated by the formula:—

$$\text{Pouring rate} = \frac{\text{Area of choke} \sqrt{ESH}}{K_2}, \text{ where } K_2 = 0.34 \text{ (as in the case of (3)).}$$

Using this pouring rate and a desired velocity of 12-in. per sec. in the runner for cleaning slag, the desired runner area is calculated by the formula:—

$$\text{Runner Area} = \frac{\text{Pouring rate}}{0.245 \times \text{Velocity (12-in. per sec.)}}$$

where 0.245 lb. per cu. in.=density of molten ductile iron.

(5) *Calculation of Ingate Area*

The ingate area is calculated from the formula:—

$$\text{Ingate area} = \frac{2 \times \text{area of choke}}{\text{Number of ingates to be used.}}$$

The number of ingates used is dependent upon the size and shape of the casting and is determined from experience. No ingates are placed nearer than 6 in. to the choke.

(6) *Calculation of the Head and Feeding Connection Sizes*

The head sizes, positions, and connections are a combination of calculation and experience. The head is calculated such that it will contain molten metal until the section that it is designed to feed has solidified. It is important to keep the connection large enough and the head close enough to the casting so that the neck will stay open until after the head has fed the casting. The formula used for calculation of head size is:—

$$\text{Head dia. (in)} = \frac{\text{Volume of casting section to be fed}}{\text{Area of casting section to be fed}} \times 5$$

$$\text{Feeding connection (dia.)} = \frac{\text{Dia. of head}}{4} + \tfrac{1}{2} \text{ in.}$$

Quality Control

After a pattern for a ductile casting has been gated, a few sample castings (usually two or three)

FIG. 3.—*Gating arrangement of a "V" groove pulley. Note the triangular shaped heads in the hub. The purpose of this unusual arrangement is to simplify the removal of the heads from the inside of the hub.*

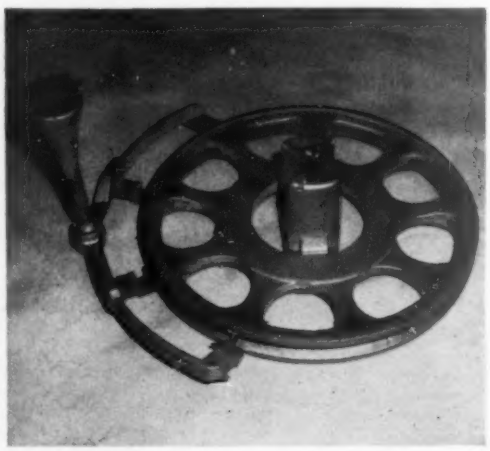


FIG. 4.—*Gating arrangement of a clutch reaction plate. The casting is made in the drag portion of the mould while the gates are poured in the cope section. Two heads are employed and gating is into these heads.*

are made on the pilot floor. These castings are checked very carefully for all foundry defects. One casting is always taken to the inspection department and sectioned through any area where it is suspected that there could be porosity. If the castings are free of porosity and moulding defects the pattern goes into production and periodically additional castings are sectioned to see that they remain free of porosity.

Even though a workable system has been devised at Lynchburg, there is a never-ending programme of searching for better methods, both from a quality and an economic standpoint. The development and improvement of the metallurgy of ductile iron continues to move forward and the gating and feeding has to keep abreast to ensure quality castings at a competitive cost.

Engineers' Refresher Course

The Institution of Plant Engineers announces that the next of its comprehensive refresher courses for works and plant engineers is to be held in Scotland this winter, at the Institution of Engineers and Shipbuilders, Elmbank Crescent, Glasgow. It is being sponsored by Sir Andrew McCance, chairman of Colvilles, Limited, and chairman of the board of governors of the Royal College of Science and Technology. The course, designed to help works and plant engineers to make the fullest contribution to increasing productivity, comprises 18 weekly lectures on Wednesday evenings, commencing November 1. The syllabus includes:—control of planning; value of new materials; planning of plants; automation; cost consciousness; space heating and thermal insulation; properties and treatment of metals and alloys, accident prevention and management. Full particulars from the secretary, 39, Elmbank Crescent, Glasgow, C.2.

Notes from the Branches

Australia (Victoria)

There was a very good attendance at the July meeting of the Australia (Victoria) branch of the Institute of British Foundrymen, which took the form of a works visit to the Commonwealth Engine Works at Port Melbourne. The vistors were able to inspect a wide range of castings, forgings, and machined parts used in marine engines, and a special attraction was a Doxford engine in the stage of assembly before a test run. This engine, a 5,500 h.p. Sides Scavenge five cylinder of 670 mm. bore, is for the bulk carrier M.V. Wollongong, a 14,000-ton vessel to be used at Whyalla.

Presentation of Awards

On July 24, at the Radio School Theatre, Melbourne, there were many parents present at the students prize-giving, sponsored by the branch in association with the Royal Melbourne Institute of Technology. The chairman for the evening was Mr. A. W. Silvester, past-president of the branch, and the presentation of awards was made by Mr. O. E. Nilsson, O.B.E., B.SC., M.I.E. (AUST.). Seventy-one awards were presented to the students of foundry and patternmaking courses, the Institute donor prizes for the outstanding students of the year going to Mr. L. N. Widders (moulding) and Mr. D. Keenan (patternmaking).

August Meeting

The lecturer at the August meeting of the branch, Mr. H. Weatherley, discussed in his paper on "Temperature Measurement in the Foundry," optical and radiation-type pyrometers, with special attention to their use with foundry furnace installations. He also dealt with immersion-type thermocouples for molten metals; selection of suitable protecting tubes; and the requirements of indicating or recording instruments for use with these thermocouples.

THE FIRST MEETING of the 1961/62 session of the London branch of the Institute will be held on September 28 at the National Liberal Club, Whitehall Place, London, S.W.1, when the new president, Mr. A. R. Parkes, will be speaking about "My Job." The meeting commences at 7.30 p.m.

Ferro-alloy Industry in India

A symposium on the "Ferro-alloy Industry in India" is being arranged by the National Metallurgical Laboratory, Jamshedpur, India, to take place early in February, 1962. In general the symposium will cover a survey of raw materials in terms of metallurgical quality and reserves, including auxiliary requirements such as fluxes, fuels, electric power, transport, etc.; beneficiation of raw materials; evaluation of extraction techniques and processes for the production of ferro-alloys; theoretical studies of physico-chemical and thermo-dynamic principles involved in the production of ferro-alloys; advances in the production technology of ferro-alloys; utilization of by-products; standard specifications; and the present status of the ferro-alloy industry in India and future expansion plans. It is expected that inauguration of a pilot-smelting submerged-electrode Birlefco electric-arc furnace, now being installed at the NML, will take place during the symposium. Those interested in contributing papers or attending the conference should write to the director of the National Metallurgical Laboratory, Mr. B. R. Nijhawan.

Equipment & Supplies

Moulding Machine

In the latest Taccone "Hydra" pneumatic high-density moulding machine, now available in the United Kingdom from Baker Perkins, Limited, Foundry Department, Bedewell Division, Hebburn-on-Tyne, it is claimed that uniform mould hardness of up to 100 (Dietert) can be achieved using a combination of the Taccone slack-diaphragm technique and hydraulic power. In this unit the diaphragm is replaced by a multi-layer compensating pad which is expanded by normal air-line pressure immediately prior to the up-stroke of the cylinder. The air trapped behind the compensating pad (depending on the initial air-pressure and the force applied by the ram) can exceed 450 lb. per sq. in. It appears that the combination of the expansion of the compensating pad and the upward stroke of the hydraulic cylinder maintains the sand in motion and this fluid action enables the sand to fill pockets or crevices. The design and construction of the machine is such that all hydraulic units are kept clear of the mould area, thus eliminating oil contamination of the moulding sand. Speeds of up to 300 moulds per hour are mentioned. In order to overcome objections to using oil hydraulics for foundries, a fire-resistant fluid is used in the hydraulic circuits of the machine.

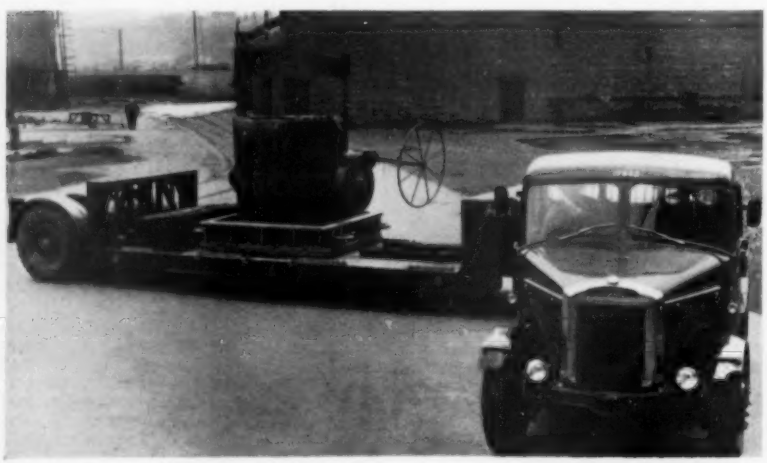
Bell-type Resistance Furnace

A lightweight bell-type electric-resistance furnace, embodying a low-thermal-mass form of construction, has been specifically designed by G. W. B. Furnaces, Limited, Dibdale Works, Dudley, in conjunction with engineers of the South of Scotland Electricity Board, to achieve a predetermined heating and cooling cycle, while at the same time keeping overall weight, price and running costs to a practicable minimum in relation to the large physical proportions involved. Although the furnace is also suitable for annealing and normalizing, it is primarily designed for the stress-relieving of heavy charges such as large steel castings and like components. Such treatment usually involves heating to a temperature normally within the range of 600 to 650 deg. C., holding at this temperature for a period dependent upon the maximum metal thickness and finally cooling down to 300 deg. C. at a predetermined rate.

The heating bell casing is a fabricated, mild-steel structure, having a main carrying frame of rolled-steel sections with a single lifting-eye. The casing is lined with a low-thermal-mass insulation embodying specialy moulded semi-refractory element-support bricks. Nickel/chromium (80/20) heating elements, in coil form, are set in the sidewalls and roof of the chamber. Charge-support members are provided, carried on mild-steel posts which pass through the hearth insulation so that the charge load bears directly on the steel-base structure. The furnace rating is arranged in an appropriate number of zones dependent upon the chamber size, and the process cycle is governed by a programme controller. Permanent records of each treatment is provided by a supplementary recording instrument. All essential ancillary electrical equipment is included.

Screw-type Feeder

Simon Handling Engineers, Limited, Cheadle Heath, Stockport, Cheshire, and Henry Simon, Limited, have recently placed on the market new precision equipment for metering dry materials into processing machinery. The unit—the Vibra screw feeder (Fig. 1)—incorporates a screw mounted on a vibrator in such a way that the screw itself, the screw trough, the screw bearings and discharge tube all vibrate as one assembly whilst the screw rotates. The standard range of feeders available consists of 10 graduated sizes having screws from ½ to 4-in. dia. to provide feed rates ranging from a few ounces to tons per hour. All feeders are of mild-steel construction and are supplied with an integrally-mounted 1½ cu. ft. capacity hopper. If greater hopper capacity is required, it can be provided in the form of a supplementary hopper, separately supported and entering the feeder hopper to a depth of approximately 8 in. Alternatively, a feeder pipe may be used to connect the hopper with a remote bin. The manufacturers claim that the vibratory action of the feeder overcomes sticking, bridging and flooding and maintains a constant level of material over the screw to eliminate fluctuations in rate of feed. In addition, the feeder is designed to handle fine powders, flakes and pellets without degradation taking place and another claim made for the unit is



Ladle Trailers

For hauling trailers with ladles of molten steel at the East Hecla foundry of Hadfields Limited, Sheffield, this Scammell Highwayman tractor is reported to be the first for this duty to be equipped with power-assisted steering. It takes the ladles from the melting shop to the pouring bay. This type of steering was specified to assist the accurate manœuvring necessary for this type of haulage—involving a gross train weight of 52 tons. (Courtesy: Leyland Motors, Limited.)

that delicate crystalline materials can also be handled without breaking down. To meet specific chemical conditions or other requirements, aluminium and plastic finishes can be supplied. Foundry uses for such equipment include such obvious applications as making additions to moulding- and core-sand mixes.

Carbon-monoxide Detector

Herzbi, Limited, 57, Lordship Park, London, N.16, have recently introduced into the UK a carbon-monoxide detector which has been in existence for less than two years and has achieved considerable acclaim in Europe, USA and Canada. The detector was invented at the State Crime Detection Laboratory in Denmark and takes the form of a 2¼-in. sq. plastic plate carrying a disc-like insert containing palladium chloride suspended in a silica gel of the same yellow tint as the plate. In the presence of carbon monoxide, the palladium salt is reduced and the insert turns grey or black, depending upon the degree of concentration of the gas. Carbon monoxide in a concentration of 0.01 per cent. takes less than 15 min. to detect, 5 min. if the concentration is 0.02 per cent., and detection is practically immediate when the proportion reaches 0.05 per cent. it is stated. After blackening, self-regeneration will take place by oxygenation as a result of exposure to non-contaminated air for from 20 min. to two or three hours. The plate can be used several times before losing its efficiency, but blackening after exposure to impurities of the air (hydrogen sulphide, for example) involves loss of efficiency. The detector is perforated for convenience of hanging in a suitable position and would appear to have applications in foundry and furnace work. The life of the plate after removal from the packaging is a month.

Hardness Tester

Two instruments are being marketed on behalf of Shore Instrument & Manufacturing Company of New York by their sole agents for the UK and the Commonwealth (except Australia), Griffin & George (Sales), Limited, Ealing Road, Alperton, Middlesex. They are a new Shore Scleroscope model C.2 (an improved, direct-reading instrument for the testing of thin metal sheets, chilled-iron rolls, gears, axles and other machined parts). The instrument may be used free-hand and this enables inspection to be made anywhere along a production line. A conversion table to Brinell and Rockwell C scales is available. The second instrument, model D, substitutes a dial and pointer for the reading of hardness numbers instead of the vertical scale behind the hammer tube. This dial, being also graduatd in Brinell and Rockwell C hardness numbers, facilitates direct reading.

Labels: New "Flexolux" labels have been developed by Wam-Speedwork, Bowlers Croft, Basildon, Essex, specially for address and instruction use on packing cases, where rough handling and exposure demand utmost strength and resistance to abrading, weather, rodents, insects, mould and even fire. Another obvious use is for castings and components, when the same material can be made up with brass eyelets and wires for attaching to products themselves. For case work, the labels are available, plain or printed, in almost any rational size up to 6 in. wide by 9 in. deep or in continuous lengths. The labels are generally in reel form and pinhole-perforated so that they can be over-printed on machines. They also take readily to china-graph and waterproof pencils, it is stated.

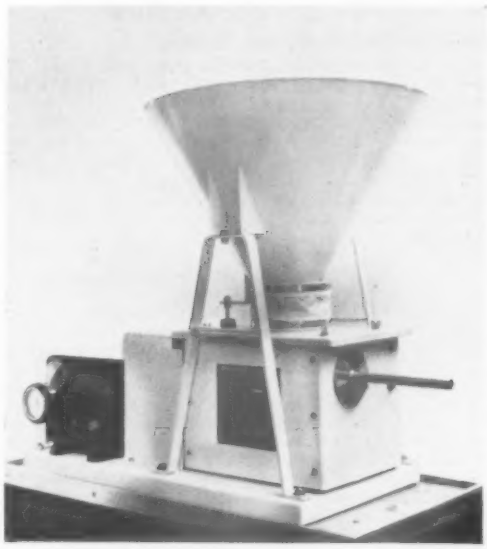


FIG. 1.—*"Vibra" screw feeder for introducing and metering powdered materials into processing machinery (Simon Handling Engineers, Limited). It was shown recently at the Moscow Trade Fair.*

Abrasive Sponge/wheels: Finishing Aids & Tools, Limited, Chandos House, Buckingham Gate, London, S.W.1, are marketing new Artifex abrasive sponge/wheels of cellular structure, which, it is claimed, gives a high degree of resiliency and necessitates only light pressure when in use. It is stated that no coolants, lubricants or compositions are needed, and the sponges require only light and infrequent dressing. The material is available in four grades, soft, medium-hard, hard, extra hard, and in a complete range of grain sizes, with wheels up to 16-in. dia. and 4-in. thick.

Oil Meter: An oil meter which it is claimed can measure accurately the flow of fuel oil at rates as low as 1½ gall. per hr. under heads as low as two ft. is now available from Walker Crosweller & Company, Limited, Cheltenham. The instrument, which is of the integrating type, is a specially-calibrated version of the company's standard ½-in. Arkon oil meter, and is designed for recording such information on many of the smaller industrial applications namely oil-fired furnaces and ovens; it is stated to be accurate to within ±1 per cent.

Pneumatic Screwdrivers: B. O. Morris, Limited (Morrisflex), of Coventry, sole UK agents for Grasso Air Tools (made in Holland), announce the introduction of a new line of screwdrivers and nutrunners, which are described in their catalogue ZA.1/Supp.2.

Stencil Ink: J. & H. Rosenheim & Company, Limited, Craigton Industrial Estate, Glasgow, S.W., announce that their stencil ink is now available in blue, green, white, red, orange, yellow and aluminium.

Price reductions for calcium silicide are announced by Toxane, Limited, 47, High Street, Edgware, Middlesex.

American Letter

GIFS Ductile-iron Section Meeting

The ductile-iron section of the Gray Iron Founders' Society held its first annual meeting at the Case Institute of Technology, Cleveland, on June 25, when approximately 90 representatives from 45 companies participated. During the course of the meeting, six papers were presented, under the chairmanship of Mr. J. Perry (of Grede Foundries Inc.), and chairman of the GIFS ductile-iron committee. The first contribution was presented by Dr. Lynn Ebert, executive officer, department of metallurgical engineering, Case Institute, under the title "Heat-treatment of Ductile Iron." This discussed a research project sponsored by the Gray Iron Founders' Society and it was stated that in the work carried out, various amounts of manganese and silicon were added to an alloyed ductile iron containing a base composition of approximately 3.7 per cent. carbon, 2.45 per cent. silicon and 0.26 per cent. manganese. The effect of these alloying elements on the desired quenching temperature was determined by heating small specimens of each composition to temperatures ranging from 760 to 982 deg. C. Specimens for hardness and tensile testing of each were austenized at optimum temperatures selected, quenched and tempered over a temperature range of 205 to 677 deg. C. to determine the response to tempering. As a result of the work carried out, it was stated that silicon was found effective in increasing the critical temperature range and in raising the tempering response. Manganese, in amounts up to 1.10 per cent., decreased the critical temperatures, improved hardenability and reduced tempering response. Extremely high tensile and yield strengths were attainable, with moderate ductility, by the proper selection of heat-treating conditions, with only moderate silicon and manganese conditions.

A panel discussion of treatment and composition *versus* final properties was presented by four speakers, Mr. R. A. Clark (of Union Carbide Metals Company) discussing methods of making additions of magnesium and its effect on grey iron; Mr. H. H. Wilder (of Vanadium Corporation of America) dealing with post-inoculation effects in the production of ductile iron; Mr. D. Matter (of Ohio Ferro-Alloys Corporation) explaining the functions of normal elements in ductile iron in the as-cast and annealed conditions, and Mr. R. E. Savage (of International Nickel Company) dealing with the effect of alloy additions on properties of ductile iron.*

A review of ductile-iron gating and feeding practice was presented by Prof. J. F. Wallace of Case Institute and the final paper of the meeting was presented by Prof. D. K. Wright (Case Institute) who discussed casting design. During the course of his remarks, he stated that castings were usually over-designed, and that engineers welcomed the assistance of founders in designing.

AFS Conference

"New Horizons in Metal Casting" is the theme of the East Coast Regional Foundry Conference of the American Foundrymen's Society. Sponsored by the Metropolitan, Chesapeake and Philadelphia Chapters, the Conference is to be held on September 22 and 23 at the Statler Hilton Hotel, New York City. Among the papers to be presented are the following: "Education and Management Improvement in the Foundry," by H. F. Taylor (Massachusetts Institute of Technology); "Engineering Properties of Various Cast Irons," by V. H. Patterson (Vanadium Corporation of America); "Influence of Inoculation on the Structure of Grey Cast Iron at Various Equivalences," by H. D. Merchant (Owens Illinois Technical Centre); "Post Inoculation of S.-g. Iron," by W. C. Jeffrey (McWane Cast Iron Pump Company); "Progress of Solidification in Inoculated and Uninoculated Grey Iron," by H. D. Merchant; "Use of Calcium Carbide in Acid Cupolas," by R. Clark (Union Carbide Metals Company); "Use of Wetting Agents in the Brass and Bronze Foundry," by W. N. Richards (Deynor Corporation); "Round-grain Carbon/Sand—a New Moulding Medium for Brass and Bronze," by E. G. Gentry (Humble Oil & Refining Company); "Superston—a New High-strength Aluminium-bronze," by F. Herlihy (American Brake Shoe Company); "New Developments in Melting Brass and Bronze," by H. F. Gauker (Ajax Magnethermic Corporation); "AFS Brass and Bronze Research at the University of Michigan," by R. W. Ruddle (chairman, Brass and Bronze Research Committee, Foseco Inc.); "Latest Developments in Core Binders for Aluminium, Sand, and Permanent-mould Castings," by R. M. Ovestrud (Reichold Chemicals Inc.); "Present-day Melting Equipment for Non-ferrous Metals," by R. P. Dunn (Lindberg Engineering Company); "Degassing Aluminium with Nitrogen/Chlorine Mixtures," by a representative from National Cylinder Gas Company; "Pearlitic Malleable Iron and its Applications," by Professor R. Schneidewind (University of Michigan); "Laboratory Controls in a Malleable Shop," by G. Mannweiler (Met. Eastern Company); "Chemical Controls in the Manufacture of Duplex Malleable," by W. R. Jaeschke (Whiting Company); and "Recent Developments in Malleable Iron," by N. Birch (Albion Malleable Iron Company). In addition, seven speakers will discuss the latest technical developments in the steel-casting industry.

Hard-facing of Steel Castings

In a recent issue of the (American) *Welding Journal*, there is an article on methods employed for prolonging the performance of steel castings for blast-furnace use by the hard-facing process. In 1958, the United States Steel Corporation inaugurated a search for materials and methods for hard-surfacing the principal charging components of a blast-furnace top, *i.e.* the bells and hoppers.

After a number of trials, it was decided to use iron-base alloys—except in two instances in which a nickel-base alloy was used in seat areas. It was found that nickel-base deposits gave a readily-machinable and highly-polished seat area with a hardness of 27 Rockwell C scale. However, the use of this material was limited due to its high cost and inability to resist abrasive wear. Several applications using high-carbon (2.5 to 3.0 per cent.) and high-chromium (26 to 28 per cent.) alloys were then made (limited to burden areas). The iron-base deposits standardized upon were the 8 per cent. chromium, 2 per cent tungsten alloy for the burden area, and a 5.5 per cent. nickel and 5.5 per cent. molybdenum steel for the seat. Both of these alloys are martensitic as deposited, with hardness ranges of 53 to 57 Rockwell C and 40 to 44 Rockwell C respectively. All welding was carried out using the automatic submerged-arc method, with a neutral flux.

UNITED STEEL COMPANY'S film "Stone into Steel" has been awarded the Critics Circle Award for the best short subject at the Stratford (Ontario) International Film Festival.

* A lengthy abstract of the paper by Mr. R. E. Savage is to be published in the JOURNAL.

Research at East Kilbride

Established by the Department of Scientific and Industrial Research after the second world war, the National Engineering Laboratory, at East Kilbride, Glasgow, to-day, after a decade of pioneer work, claims to be one of the premier centres for engineering research in Britain, its keynote being co-operation with industry.

In its annual report,* published earlier this month, the chairman of the NEL steering committee, Vice-Admiral Sir Frank Mason, K.C.B., reviews the Laboratory's progress over a wide range of activities. Three very successful projects have been the automatic correction of errors in machine tools, development of hydrostatic transmissions, and the cold extrusion of steel. Current investigations include the high-temperature fatigue properties of brazed joints, such as are used in one of the methods of attaching rotor blades, and work is also being carried out to provide information on the fatigue strength of hollow blades produced by different processes. Determination of the relative rate of crack growth for a wide range of engineering materials; lubrication of hypoid gears, and new instruments and measuring techniques also feature in the Laboratory's work.

Sponsored Research

One of the most important services to industry is NEL's facilities for sponsored investigations and tests. These are being more and more frequently used by industry, ranging from long-term basic investigations and design studies to development projects and calibration of instruments.

The Laboratory has unique facilities to offer industry and is particularly interested in proposals for novel investigations likely to lead to important new developments. Assistance can be provided in many ways, from accepting the full burden of the work to supervising or assisting a firm's own engineers and scientists. Charges depend on the duration and complexity of the investigation and in some cases it can be arranged to make the results completely confidential to the sponsor. The Report contains several examples of the work NEL was asked to carry out for industry during 1960. They include tests on mechanical transmissions, noise in machines, water-turbine tests, and improvement of performance of the hydraulic gear in a refuse-collection vehicle.

* National Engineering Laboratory Annual Report 1960 published for DSIR by Her Majesty's Stationery Office; price 8s. 0d. (USA 90 cents), postage 5d.

326th Master Cutler elected

Mr. Gerard Young, chairman of the Tempered Group of Companies, Sheffield, was elected the 326th Master Cutler on September 8. The present junior warden, Mr. Stephen Martin de Bartolome, chairman of Spear & Jackson, Limited, was appointed to succeed Mr. Young as senior warden. Mr. Howard Poulson Forder, a director of United Steel Companies, Limited, and director and general manager of Samuel Fox & Company, Limited, was elected junior warden. Searchers elected were Sir Stuart Goodwin, Colonel E. W. Wilkinson, Mr. J. R. A. Bull, Mr. E. Mensforth, Mr. A. B. Hampton, and the Hon. M. R. Balfour. Of these, Mr. Bull is a new appointment. The former Master Cutler, Mr. C. H. T. Williams, was appointed an assistant searcher.

Die Design Symposium

A symposium on "Die Design" is being organized by the Light Metal Founders' Association to take place at the Queen's Hotel, Birmingham, on October 3. Mr. L. Fletcher will preside and the following programme has been arranged:—

Gravity Dies

The proceedings will commence at 10.45 a.m. with the chairman's introductory remarks followed by Session I on gravity dies. The first paper, to be presented by Mr. W. Goode (Birmingham Aluminium Casting (1903) Company, Limited), will deal with (*a*) product design; basic principles of design; casting control features—runners and risers, and (*d*) thermal control. The second paper at this session by Mr. R. R. Woodward (High Duty Alloys, Limited), will cover (*a*) cost control by design—time and labour utilization; (*b*) quality; (*c*) metal yield; (*d*) die cost; (*e*) fettling costs, and (*f*) mechanization—powered and unpowered.

Pressure Dies

Session II on pressure dies starts at 2.30 p.m. when Mr. R. P. Bryan (Metal Castings Doehler, Limited) will present the third paper on (*a*) design; (*b*) equipment; (*c*) inserts; (*d*) heat-treatment of die steels, and (*e*) standardization of die parts. The three papers will be followed by a discussion. The symposium concludes with a talk at 3.15 p.m. by Mr. G. P. Welch (Wolverhampton Die Casting Company, Limited) on a "Visit to Die-casting Plants in the USA." Application for tickets should be made to the secretaries, Heathcote & Coleman, 69, Harborne Road, Edgbaston, Birmingham 15.

Foundry Apprentice Competition

The National Eisteddfods of Wales are generally believed to be confined to such arts as music and poetry, but the 1961 Eisteddfod to be held at Llanelly includes a foundry apprentice moulding competition. This is being divided into two grades as follow:—

Junior: First-, second- and third-year apprentices: In this grade apprentices will be required to produce a cogwheel of 32 teeth, with cored centre, in either cast iron or bronze. *Senior: Fourth- and fifth-year apprentices:* (*a*) a cup and saucer (as one casting) in aluminium or aluminium alloy, or (*b*) a sheave, cored, of 6-in. dia., in cast iron or bronze. All castings to be moulded in natural sand and submitted in the "undressed" condition. Each entry must be guaranteed the work of an apprentice by an apprentice master. Both grades carry a first prize of £4 and a second prize of £2.

Another competition for apprentices is for the best essay on the "Role of the Craftsman in an Age of Automation," for which the first prize is £5 and the second £2. Full details are obtainable from Mr. G. V. Jones, 2, Paddockhurst Road, Gossops Green, Crawley, Sussex.

Mr. WALTER WEST and Mr. CHARLES ROBERTSON have been appointed executive chairman and managing director respectively of Beans Industries, Limited, Tipton (Staffs). Mr. West is deputy chairman of Leyland Motors, Limited, chairman of Scammell Lorries, Limited, and managing director of West Yorkshire Foundries, Limited. Mr. Robertson is director and general manager of West Yorkshire Foundries.

Personal

Mr. W. S. B. SAMPSON has been appointed a director of Baker Perkins, Limited.

Captain MAURICE LUBY, R.N., RETD., has been appointed director of research, High Duty Alloys, Limited.

Mr. J. R. PETTIGREW, works manager of John Fowler & Company (Leeds), Limited, has been appointed a local director of the company.

Mr. FRANK T. BAGNALL, who recently retired as electric-furnace melting-shop manager of Samuel Fox & Company, Limited, Sheffield, has joined Birlec-Efco (Melting), Limited.

Mr. H. WESTON HOWARD has been appointed chairman and Mr. A. C. BALL managing director of Hayward Tyler & Company, Limited, a subsidiary of Stone-Platt Industries, Limited.

Mr. R. MURRAY HUDSON of Broomside Foundry Company, Limited, Bonnybridge, has been appointed a director of Lion Foundry Company, Limited, Kirkintilloch, as from September 1.

Mr. C. R. MEYER, formerly assistant managing director, has been appointed managing director of Cincinnati Milling Machine Company, machine-tool manufacturers, Tyburn, Birmingham.

Dr. HAROLD H. ZEISS, formerly of the research and engineering division of Monsanto Chemical Company, Limited, has been elected president and director of Monsanto Research, S.A., of Zurich, Switzerland.

Mr. LEONARD PEMBERTON has been appointed sales manager (structural steelwork) of Sanders & Foster, Limited, of Stratford, London, and Barking, Essex, a branch of the Chamberlain group of companies.

Mr. ERNEST THOMPSON, a scientific officer at Aldermaston, where he has been concentrating on controlled fusion, has been appointed a research associate at the Massachusetts Institute of Technology, United States.

Mr. JACK SHAW, manager of the constructional department of Head Wrightson (Teesdale), Limited, Middlesbrough, has been presented by the directors with a radiogram on his retirement after 50 years' service.

Mr. R. H. C. BOYS, who has taken up an appointment with the International Nickel Company (Mond), Limited, has retired from the board of the Metal Traders Company, Limited, proprietors of the Watford Foundry Company, Limited.

Mr. DAVID BUCHANAN has left the staff of the Bonnybridge Foundry after 22 years with Smith & Wellstood, Limited, to take up a post in Cumbernauld. He received a monetary gift from his colleagues in the shipping department.

Mr. F. WINSTON REYNOLDS, founder of Winston Electronics, Limited, Shepperton, Middlesex, has relinquished his duties as chairman and managing director in order to exploit new products and Mr. W. ALLEN BRIDGES has taken his place.

Mr. JAMES R. BOERGER has been appointed director of manufacturing of International Harvester Company of Great Britain, Limited, to succeed Mr. G. GORDON DAVIS who has returned to the US. Mr. Boerger has been elected a member of the board.

Mr. J. R. GLEDHILL and Mr. A. H. THOMPSON have been appointed directors of Thomas Marshall & Company (Loxley), Limited, fireclay refractory manufacturers, Sheffield. Mr. D. GREGORY has been appointed managing director of Ffrith Fireclay Company, Limited.

Mr. KEITH G. HUNTLEY has been appointed chief electronics engineer to Adrema, Limited, and will be responsible for the formation and building up of a new data-processing division to be centred on the firm's new factory at Cosham, Portsmouth.

Mr. JOHN PROUD, bronze storekeeper at the foundries division of David Brown Industries, Limited, Penistone, has retired after 21 years' service with the firm. He was presented with a gold wristlet watch to mark his retirement by Mr. J. L. Hancock, general manager of the company.

S. H. Heywood & Company, Limited, announce the appointment of Mr. H. HOLE as director and general manager of the Reddish Crane branch of the company as from early October. Mr. HAWES, the present general manager, has agreed to postpone his pending retirement indefinitely.

Mr. P. R. SCUTT, managing director of Tecalemit, Limited, recently completed an American tour. The objective of his visit was to extend the company's business in the USA, and to attend a board meeting of Imperial-Eastman Corporation of Illinois, of which company he is a director.

Mr. A. HOMER, superintendent for 15 years of Leyland Motors North works' ambulance room, retires on September 29. He has been responsible also for the organization of mass X-rays, polio inoculations and blood donations which take place in the Leyland factories from time to time.

Sir JOHN MASTERMAN has accepted an invitation from the directors of Birfield, Limited, to become adviser on personnel matters to the organization. Sir John was Vice-Chancellor of Oxford University in 1957 and 1958, and retired as Provost of Worcester College, Oxford, on July 31 last year.

Mr. MELVILLE SANKEY, chairman of J. H. Sankey & Son (Holdings), Limited, has joined the board of British Sisalkraft, Limited. (J. H. Sankey & Son, Limited, a subsidiary of J. H. Sankey & Son (Holdings), has acted as sole distributors of British Sisalkraft products since the formation of that company.)

Mr. G. T. T. JACKSON has commenced his appointment with Cranes (Dereham), Limited, trailer and semi-trailer manufacturers, Norfolk, as their Midlands-area representative. When Crane Fruehauf Trailers, Limited, commence production in 1962, he will be also acting for that company.

Mr. J. D. ECCLES has been appointed director and general manager of Head Wrightson Stockton, Limited. Mr. G. F. TAYLOR has been appointed general manager, Head Wrightson Steel Foundries, Limited, and Mr. A. J. LONG has joined the Head Wrightson Export Company, Limited, as general manager.

Mr. SYDNEY BROOKS, with 52 years' service in the machine-shop, and Mr. VERNON S. CLIFTON, foreman of the iron foundries, 47 years' service, have been presented, on retirement, with inscribed gold watches by Mr. R. Richardson, managing director of Rowland Priest, Limited, engineers, Cradley Heath.

Lt.-Col. P. F. BENTON JONES, a managing director of the United Steel Companies, Limited, has been appointed chairman of Council of the British Coke Research Association following the resignation of Sir FREDERIC SCOPES from that office. Mr. A. H. A. WYNN, the scientific member of the National Coal Board, becomes vice-chairman. Mr. G. W. J. BRADLEY who has been a member of the Council of the Association since its inception in 1944, has relinquished his membership of the Council following his retirement from the industry.

Company News

GEC Group Profit and Finance

The unsatisfactory level of profit, and finance, were two serious problems facing the board of the General Electric Company, Limited, at the present time, said Mr. A. L. G. Lindley, chairman, at the annual meeting. Addressing shareholders for the first time as chairman, he said the net overdraft, which at the end of March was £11,250,000, was now £13,000,000. Acceptance credits were up from £2,000,000 to £3,500,000. Largely responsible for the size of the overdraft was the Hunterston nuclear power station where work had absorbed £8,500,000 more than payment received on account—and this did not include any financing by GEC's associates.

Despite the high level of bank indebtedness, the company was not proposing to make a rights issue. The overdraft would remain at the present level for a short period, after which it would be reduced as a result of realizations, seasonal factors and a more satisfactory cash flow.

On current prospects, Mr. Lindley said there were good grounds for expecting a profit recovery from last year's exceptionally low level, but added: "I would not like to predict too firmly the results in profits for the year in the present unsettled state of the economy."

A. Reyrolle & Company, Limited—Payment of an unchanged interim dividend of 3 per cent. in respect of the current calendar year is announced. For 1960, this was followed by a final payment of 9¼ per cent. Reporting in April, Mr. H. H. Mullens, chairman, said that the inflow of orders had reached a high level and the works would be fully employed for at least the next 12 months.

Bromilow & Edwards, Limited, manufacturers of hydraulic tipping gear, etc., of Bolton—The company is raising its interim from the equivalent of 5½ per cent. to 6 per cent. for the year to November 30, 1961, on capital increased by a 33⅓ per cent. scrip issue. Last year's total was equivalent to 13½ per cent. Trading results so far this year would justify a higher rate of interim, state the directors, but it has been decided to restrict the payment to 6 per cent. in view of the Chancellor's appeal for restraint.

John Thompson, Limited, combustion and general engineers, of Wolverhampton—Interim dividend of 5 per cent. is being paid in respect of 1961. A similar payment was made for the previous year, but no final was declared. The 1959 total was 20 per cent. Last month Sir Edward Thomas, chairman, reported that output for the first six months of the current year was 14 per cent. higher than the corresponding half year of 1960, while orders received for the past six months were up by a similar rate.

A.P.V. Company, Limited, founders and makers of process plant and equipment in stainless steel and aluminium, of Crawley (Sussex)—Group turnover and profit for the first half of 1961 exceed those of the corresponding period last year. Interim dividends are resumed with a 3¼ per cent. declaration. The last interim was on account of 1955. Reminding shareholders of the Chancellor's request for dividend restriction, the directors state that the interim should not be regarded as denoting an increase in the year's total.

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More recently two new grades have been introduced to make die casting history, Grade No. 44 and 9X for Aluminium and Zinc respectively.

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Write for details of No. 44 (WATER miscible grade) for use with Aluminium and No. 9X, the grade for use with Zinc. We will have pleasure in sending you our literature on this subject, produced, as has been all our sales literature, for a number of years now, on a GESTETNER duplicating machine.

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News in Brief

FEDERATED FOUNDRIES, LIMITED, Glasgow, have placed an order with Leyland Motors, Limited, for six of their Comet-Scammell tractors.

CONSTRUCTION EQUIPMENT EXHIBITIONS, LIMITED, announce that the next International Construction Equipment Exhibition will be held in June, 1963.

BRUSH ELECTRICAL ENGINEERING COMPANY, LIMITED, Loughborough, Leicestershire, have gained a £1,250,000 order to supply 14 main-line diesel-electric locomotives to Rhodesian Railways.

YORKSHIRE ELECTRICITY BOARD have opened new premises in Change Alley, Sheffield 1, which replace the service centre in Norfolk Street and the public use of the Commercial Street offices.

THE NATIONAL EMPLOYERS' MUTUAL GENERAL INSURANCE ASSOCIATION, LIMITED, announced on September 6 an insurance against assault, believed to be the first of its type of insurance in the world.

AT THE SHIPBREAKING PORT of Inverkeith on the Forth, belonging to Thomas W. Ward, Limited, work is well ahead on the Britannic, the 27,000-ton Cunard liner. Next on the list for the breakers will be the aircraft-carrier Glory.

A CONTRACT valued at nearly £200,000 for power and running units for installation in Dutch-built buses has been secured by Leyland Motors, Limited, from the Netherlands Railways. The firm has also secured a £3,750,000 contract for buses from Argentina.

BECAUSE OF a falling off in demand from the motor industry, some founders at the works of Ley's Malleable Castings Company, Limited, Derby, are to be put on an immediate four-day week. The mechanized foundry is to continue to work to capacity.

ANOTHER TWO apprentices of Leyland Motors, Limited, have been awarded technical State scholarships by the Minister of Education. This brings the number awarded this year to part-time students at the company's day continuation school to 11—nearly 5 per cent. of the total awarded throughout the country.

CHEQUE FOR £100 was presented by the management of Consett Iron Company, Limited, to Mr. Richard Prince, 61-year-old motorman employed at the company's Jarrow plant, whose prompt action in switching off a faulty electric generator prevented damage which might have put the works out of action for some time.

OPTOSHIELD, LIMITED, manufacturers of eye-protection and other safety products, announce that they are transferring their production and development departments to more spacious accommodation at Watford, to implement their extensive new development programme. The sales department and head office remain at 146, Clerkenwell Road, London, E.C.1.

THE CHAMBRE SYNDICALE DES PRODUCTEURS D'ACIERS FINS ET SPECIAUX, of Paris, announce that an increase in the price of alloyed steels is imminent. It is due to the extra cost of the alloying additions such as nickel, molybdenum and the like. Altogether the increase will not be excessive, being of the order of 1.5 per cent., according to the content of the metallic additions.

DONCASTER TOWN COUNCIL on September 5 agreed to sell land to R. O. Arnold, Limited, fireplace manufacturers, to enable it to expand and employ more labour. A month earlier the Rotherham Corporation Allotments Committee refused the application after complaints by allotment holders. It was said that the firm was having to store fireplaces at Barnby Dun, several miles away, and that production was being affected.

COPPER PRODUCTION by the large mining companies in Chile totalled 41,143 tons in June, bringing the total for the first half of 1961 to 249,629 tons, as compared with 247,775 tons in the corresponding period of last year. The USSR is reportedly negotiating the purchase of up to 60,000 tons of copper a year from Chile's medium and small copper-mining companies. Similar negotiations carried out earlier this year were unsuccessful.

A COMPANY recently registered in this country under the title of Wichita United, Limited, of Basildon Industrial Estate, Essex, England (Basildon 20421), has been set up to undertake the manufacture and sale of Wichita clutches and brakes for Europe and British Commonwealth (excluding Canada, but including South Africa). From the designs illustrated in the firm's literature, it is clear that cast components on a substantial scale are involved.

IMPORTANT DEVELOPMENTS are being undertaken in Sunderland by Hepworth & Grandage, Limited, of Bradford, and the David Brown Group of Huddersfield, states Mr. Roland Vidal, Sunderland's new industrial development officer, in his first annual report. But, he says, despite these, the town will still be facing an unemployment problem in 1966 unless more new industries can be attracted to the town. He says that about 5,300 new jobs are expected to result from the known development programmes, but 10,800 will be needed by 1966.

WHAT IS PROBABLY the world's most famous name in lawnmowers became linked with an equally famous name in brewing when a new Ind Coope public house was opened near the Sunnyhill Avenue, Derby, works of Qualcast, Limited. The new house has been named "The Panther" after the Qualcast lawnmower of that name, and as a further compliment to the company, one of the bars has been christened "The Grass Box." Among those who attended the opening ceremony were Mr. R. J. L. Bristow, director and manager, Ind Coope (East Midlands), Limited, and Mr. H. Clark, Qualcast, Limited.

THE FAMOUS "YEAR KNIFE" of Joseph Rodgers & Sons, Limited, Sheffield, is having another blade added to keep it up to date. This collection of knives, unified in the shape of a cross, normally is displayed in a glass case in the managing director's room and contains a blade or tool for every single year of the Christian era. It was made in 1822 and stands 32-in. high and 22-in. wide. The firm also possesses the Norfolk Knife, a companion piece, which stands 34-in. high and 22-in. wide. The blades which fan out like a pen knife, are etched with famous personalities, well-known buildings or hunting scenes. This took two years to make.

A NATIONAL MAINTENANCE EXHIBITION, specifically concerned with maintenance engineering in industry, is to be held at the Central Hall, Westminster, from November 13 to 16. A four-day conference is being conducted concurrently with the exhibition. On the day following the conference, an extensive programme of visits for delegates has been arranged to such places as the Renault works at Billancourt, France; Battersea Power Station; the Coryton Refinery at Stanford-le-Hope of the Mobil Oil Company, Limited; paints division of Imperial Chemical Industries, Limited, at Slough, and the *Daily Mirror* building in Holborn, London.

Continued on p. 370

Photo by permission of Esso Petroleum Co. Ltd. Purfleet, Essex.

H IS FOR HOSES at Esso Petroleum Co., Ltd., Purfleet, Essex where 300 lengths of Goodyear oil discharge hose are used in the ships exchange layout, the batch blending section of the new lubricating oil warehouse and the road/rail tanker loading bays. Resisting attack by mineral oils, greases and most industrial solvents, Goodyear Oil Hose is immensely strong yet flexible, with a tough cover that stands up to abrasion and gouging. It is one of more than 500 types of Goodyear hose built for specific needs—Write today for full information.

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News in Brief

continued from p. 368

MR. DONALD WALKER, managing director of A. Kitchen-D. Walker, Limited, Hexagon Works, Halifax, has designed a simplified 5¼-ton horizontal facing, boring and turning machine, which has now been introduced by the firm. Mr. Walker designed the machine for the rapid machining of the ends of pipes produced by Stanton Ironworks Company, Limited, by semi-skilled labour. Stanton Ironworks bought two of these machines initially and have now placed a repeat order. It has already attracted attention in Germany, South Africa and Australia.

THE BROCHURE entitled *The Money* in which the Davy-Ashmore Group explains its annual accounts to its employees is the first since Davy-United Engineering Company, Limited, merged with Power Gas Corporation, Limited. It is reported that the Group exported to 69 countries during the year. The brochure lists the numbers employed by the various companies of the group. They total some 8,000. The biggest single employer of the group is Davy and United Engineering Company, Limited, of Sheffield. In 1960-61, orders brought in £41,400,000, of which materials and services took £29,300,000, tax nearly £2,000,000 and wages and salaries almost £7,500,000, £1,800,000 went back into the business, nearly twice as much as went in dividends.

FOUR LEADING MEMBERS of a Russian trade delegation in Britain recently visited Sheffield for a tour of the works in the John Brown Group of companies, organized by the group's special engineering and nuclear division. They were entertained to dinner by Mr. Eric Mensforth, chairman of Firth Brown Tools Limited, and deputy chairman of the John Brown Group. Their tour included visits to Cravens, Limited, to see rolling stock under construction, Firth Brown Tools, Limited, and Markham & Company, Limited, Chesterfield. The John Brown Group has a good deal of work in hand for Russia. It includes a £2,000,000 order for two major chemical plants by Wycon Services, Limited, and £3,000,000 order for plant to produce raw material used in the manufacture of detergents.

Obituary

Mr. E. T. ROBERTS, a director of Bilston Foundries, Limited, has died aged 52. He had been with the company for about 30 years.

The French Press announces the death of Mr. JEAN-PIERRE MENAT, head of the cast-iron division of the *Centre Technique des Industries de la Fonderie*. He was 61 years old.

Mr. A. C. NICHOLSON, formerly managing director of W. N. Nicholson & Sons, Limited, agricultural and general engineers, of Trent Ironworks, Newark, has died at the age of 82. Mr. Nicholson was the third generation to control this family engineering business. He became managing director in 1934 and retired in 1960.

Formerly Second Secretary in the Treasury and, for the past three years, chairman of the Iron and Steel Holding and Realisation Agency, Sir HERBERT BRITTAIN has died at the age of 67. He succeeded the late Sir John Morison as chairman of ISHRA in June, 1958, and though his tenure had been comparatively short he brought to the important task of denationalizing the steel industry and disposal of the assets of State-owned companies to private investors, exceptional acumen and great administrative and organizing ability.

Translation Services

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

BISI 1796 DIFFERENTIAL DETERMINATION OF OXYGEN IN METALS BY BROMINATION-REDUCTION. (From French.) Durand, R., & F. Nouyrigat. *Rev. Mét.*, 1960, *57*, Apr., 347-353. (£3 10s.). Dissolved or oxide O is transformed into CO by bromination in the presence of C at 1,000 deg. C.; the CO is oxidized to CO_2 and determined conductimetrically. Dissolved and combined O can in some cases be differentiated (12 refs.) (*JISI* abstract 1961, Jan., 107a).

BISI 2271 OPERATING EXPERIENCE WITH FLAME SPECTROMETERS IN THE DETERMINATION OF CALCIUM AND MAGNESIUM IN STEELWORKS LABORATORIES. (From German.) Abresch, K., & W. Dobner. *Arch Eisenhütt.*, 1958, *29*, Jan., 25-34. (£9 15s.) A quartz prism-flame spectrometer is used to determine the CaO and MgO contents. Concentrated strontium chloride solution is added to counteract the effect of the solvents. In blast-furnace slags the effect of SiO_2 on Ca determination is considerably reduced by the addition of strontium chloride. The SiO_2 is therefore evaporated with hydrofluoric acid or filtered off. Tables and diagrams are given and emissivity; information is given on results, errors, reproducibility and duration of tests. (*JISI* abstract, 1959, Feb., 219).

BISI 2329 TWO-COLOUR PYROMETER. (From French.) Rodieq, P., & G. Maillot. *Rev. Mét.*, 1955, *52*, June, 477-484. (£5 5s.) A description is given of a two-colour pyrometer designed for measuring the temperature in a basic Bessemer converter by sighting the instrument through one of the blowing nozzles. The results of full-scale trials are described. (*JISI* abstract 1956, Feb., 221.)

Translations in course of preparation include:—

BISI 2247 ULTRASONIC METAL CLEANING. (From Norwegian.) Wahlman, O. *Norsk Galvano-Teknisk*, 1961, *4*, (1), 6-8.

BISI 2365 CONTROL DEVICE FOR ELECTRIC CURRENT IN STEEL-MELTING ARC-FURNACES. (From Russian.) Svenchanskii, A. D. *Vestnik Elektroprom.*, 1960, Aug., 23-26.

BISI 2370 A SPECTROGRAPH FOR ANALYZING MOLTEN METAL AND SLAG. (From Russian.) Kustanovich, I. M. Fiz. Sbornik L'vovsk univ., 1958, vypusk 4, (9), 461-452.

The following new translations are now in preparation, and will be included in the BISI Translation Service if more requests are received.

E 2374 DETERMINATION OF CARBON IN STEELS AND FERRO-ALLOYS WITH LOW-CARBON CONTENTS. (From French.) Dézirat, R. *Ibid.*, 1960, *57*, Dec., 1125-1132.

E 2375 DETERMINATION OF OXYGEN IN STEELS BY MELTING IN REDUCING CONDITIONS UNDER ARGON. (From French.) Hanin, M. *Ibid.*, 1960, *57*, Dec., 1133-1141.

Anodizing Conference

Last week at the University of Nottingham, the Aluminium Development Association organized a conference on the subject of anodizing. A total of 18 papers was presented at six sessions. A dinner was held on the Tuesday evening when the principal guests were the Vice-Chancellor of the University, Mr. B. L. Hallward, M.A., and the president of the Institute of Metals, Prof. H. O'Neill, D.SC. Representatives attended the conference from seven European countries and from Canada, New Zealand and the USA. As part of the conference, an exhibition of anodized components was staged. A bound volume of the preprints is available at a cost of one guinea from the offices of the ADA at 33, Grosvenor Street, London, W.1.

THE DERBY SECTION of the National Trades Technical Societies is holding a film evening at the College of Art, Green Lane, Derby, on September 29, commencing 7 p.m.

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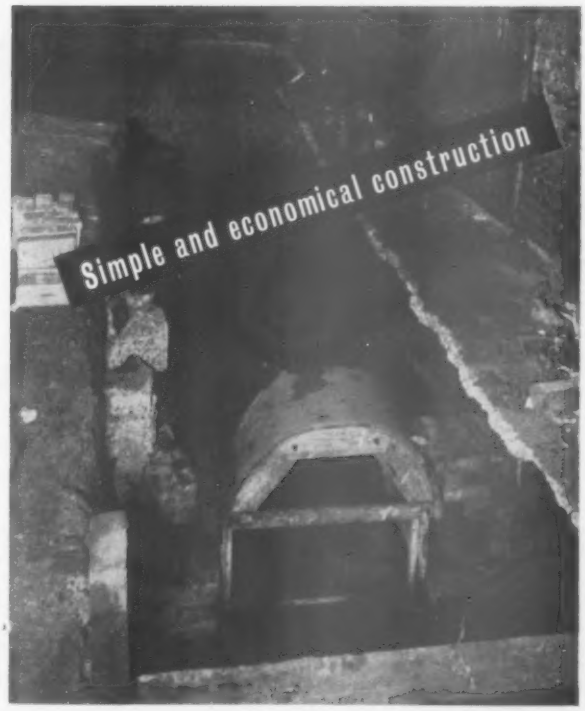

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AP73

Raw Material Markets

Iron and Steel

Trading conditions at the iron foundries show little change, and although many establishments are fairly well employed there is much room for improvement. Demands for high-quality castings are steady and the engineering and speciality foundries supplying these are able to obtain reasonably good outputs, though these are confined mainly to current business as delivery schedules are generally up to date and order-books show little forward bookings.

Foundries supplying castings to the motor-car industry continue the most gainfully employed and are receiving good support, particularly for castings required for commercial vehicles and tractors. Overall however, current demands from the car industry are much less than those called for during the boom period. Machine-tool makers are also absorbing good quantities of castings, but these show some decline on recent deliveries, and this also applies to many other consumers of high-duty castings.

The building trades continue to take appreciable quantities of castings, but the light foundries catering for the domestic utensil trade have capacity to spare. Other types of castings being produced by some of these foundries, mainly for the engineering trades, are helping to improve their output.

There is no scarcity in the supply of raw materials to the iron foundries. All grades of pig-iron are plentiful and available in much larger quantities than those now being called for. From the engineering and speciality foundries fairly substantial demands continue to be made for the low-phosphorus irons and the several producers are able to cope easily with these requirements. Hematite and refined irons are also readily available. The current demands for high-phosphorus irons are well below capacity levels. The foundries are well covered for their scrap supplies, apart from some special grades, and foundry coke, ganister, limestone, and firebricks are available to requirements.

Business at the re-rollers is well below capacity levels, and only moderate demands are being made for small bars, light sections and strip. Order-books are confined to current business and this is barely sufficient to make up day-to-day rollings. Forward bookings are scarce apart from reinforcing rods and bars which continue in good demand. Plentiful supplies of mild steel billets are available from home steelworks, but from most areas current demands are on a much reduced scale. Carbon steel billets are also in good supply. Makers of alloy steels are open to accept more business although on an extended delivery basis. Arisings, at the steelworks of suitable re-rolling defectives and crops are being taken up by the re-rollers.

Non-ferrous Metals

Demand for copper in London is reasonably good, but there is not much selling so that if demand should increase to any considerable extent the quotation should soon rise. In the US demand has maintained its recent improvement and, although there has been a slight easing of the intake price for scrap, there is not much copper available for early delivery. However, buying pressure has not reached the point where the price is ready to be raised and 31 cents a pound is still applicable to both custom smelters and producers.

In tin, the news that the GSA had asked the US Congress to waive the six-month delay rule for releases of metal from the national stockpiles brought prices down with a bump last week. Shortly afterwards it became known that GSA had rejected all tenders put forward for the third instalment of Texas tin as the bids were too low. As the highest bid put forward was almost $1.20 cents a pound, equivalent to nearly £960 a ton, the feeling has grown that even if Congress does release the asked-for 50,000 tons of tin it will not be "dumped" on the market at prices below the market rate. This feeling caused the tin quotation to bound upwards and at present it is fluctuating around £945 a ton in London and around $1.20 cents a pound in New York.

Depending upon news of the GSA request for the release of 50,000 tons of pig tin the price in London is apt to be fairly steady until the meeting of the International Tin Council. This has been postponed yet again, the latest date being October 9.

Lead in London is showing more activity, but is still unreceptive to selling pressures. The price is steady around £64 a ton in London and unchanged at 11 cents a pound, New York. Zinc in London is trying to rally without much success, but the price has improved to around £73 a ton. In the States the market is reasonably good and the quotation is unaltered at 11½ cents a pound.

Increases of Capital

QUALCAST, LIMITED, Derby, increased by £1,000,000 in 5s. ordinary shares, beyond the registered capital of £2,075,000.

INDUSTRIAL PUMPS, LIMITED, Thurcroft, nr. Rotherham, increased by £15,000 in £1 ordinary shares, beyond the regis-

SIGMUND PUMPS, LIMITED, Gateshead, increased by £100,000 in £1 ordinary shares, beyond the registered capital of £160,000.

POLLARD BEARINGS, LIMITED, London, W.1, increased by £240,000 in £1 ordinary shares, beyond the registered capital of £260,000.

LOEWY ENGINEERING COMPANY, LIMITED, Bournemouth, increased by £100 in £1 shares, beyond the registered capital of £200,000.

RANGE BOILERS, LIMITED, Stalybridge (Ches), increased by £240,000 in 5s. ordinary shares, beyond the registered capital of £300,000.

METAL BOX COMPANY, LIMITED, London, W.1, increased by £5,000,000 in £1 ordinary shares, beyond the registered capital of £25,000,000.

BRIDGE FOUNDRY COMPANY, LIMITED, Wednesbury, increased by £90,000 in £1 ordinary shares, beyond the registered capital of £110,000.

HENRY SIMON (HOLDINGS), LIMITED, engineers, etc., of Stockport, increased by £1,999,900 in £1 ordinary shares, beyond the registered capital of £100.

TITALLIUM, LIMITED, scrap metal merchants, etc., London, E.C.2, increased by £13,000, in £1 ordinary shares, beyond the registered capital of £2,000.

A.C.G. (NON-FERROUS) FOUNDERS, LIMITED, Hounslow (Middx). Increased by £14,000, in £1 ordinary shares, beyond the registered capital of £500.

FOLLSAIN, LIMITED, smelters, ironmasters, etc., of Rugby, increased by £75,000, in 4s. ordinary shares, beyond the registered capital of £280,000.

STAVELEY COAL & IRON COMPANY, LIMITED, London, S.W.1, increased by £3,229,288 in £1 unclassified shares, beyond the registered capital of £6,770,712.

JOHN ARMSTRONG, LIMITED, machine-tool makers, etc., of Kenilworth, increased by £25,000, in £1 ordinary shares, beyond the registered capital of £25,000.

THEODORE EVANS, LIMITED, ironfounders, etc., of Dudley (Worcs), increased by £65,000, in £1 ordinary shares, beyond the registered capital of £10,000.

SUTLER BROS. (LONDON), LIMITED, engineers, etc., of London, W.C.1, increased by £150,000, in 30s. preference shares, beyond the registered capital of £150,000.

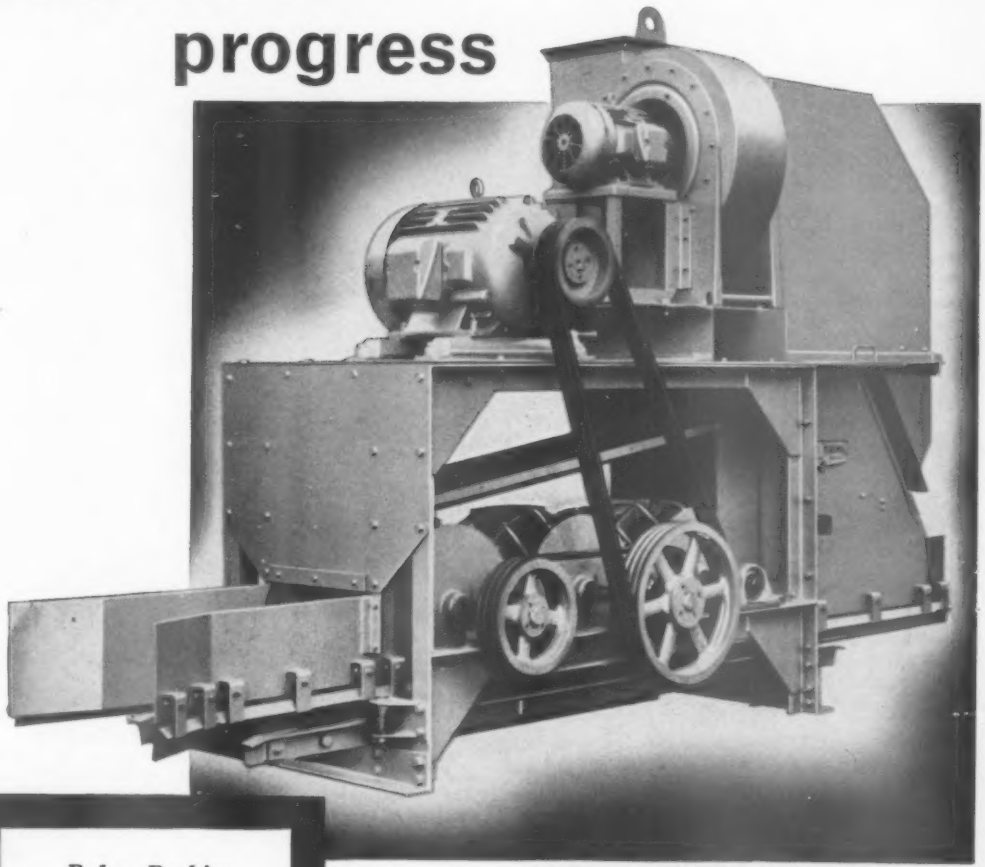
BIR-VAC, LIMITED, dealers in high vacuum pumps, etc., of Pershore (Worcs), increased by £5,000, in £1 ordinary shares, beyond the registered capital of £5,000.

VITTORIA BRASSFOUNDRY & ENGINEERING COMPANY, LIMITED, Aldridge (Staffs), increased by £12,500, in £1 ordinary shares, beyond the registered capital of £2,500.

WARNER & COMPANY, LIMITED, pig-iron manufacturers, etc., of Cargo Fleet, Middlesbrough, increased by £80,000, in 5s. shares, beyond the registered capital of £125,000.

DOWDING & DOLL, LIMITED, machine-tool dealers, etc., of London, W.14, increased by £50,000 in £1 ordinary shares, beyond the registered capital of £200,000.

pattern for progress



Baker Perkins
Foundry Machinery

The PEKAY aerator/coolerator

* Continuously processes and conditions foundry sand * Fits flat, troughed, horizontal or inclined rubber belt conveyors. * Specially designed undercarriage does not increase wear or tension on belt. * Cheaply and quickly installed. One of the range 10 tons to 450 tons. 18" to 48" wide belts. * Increases output and improves quality from existing mixing plant.

Write for further details of Baker Perkins Pekay Aerators/Coolerators to :

BAKER PERKINS LTD., ENGINEERS,
Foundry Machinery Department, Bedewell Division, Hebburn-on-Tyne, Co. Durham. Tel. Jarrow 897124

B.P.F. 14

Current Prices of Iron, Steel, and Non-ferrous Metals

(Basis prices, delivered unless otherwise stated. Prices following side headings marked* are subject to an increase of 1 per cent. under Iron and Steel Board Price Determination, 1961, No. 2.)

September 20, 1961

PIG-IRON

*** Foundry Iron.**—No. 3 IRON, CLASS 2, 10-ton lots or over, Middlesbrough, £21 17s. 0d.; Birmingham, £21 9s. 3d.

*** Low-phosphorus Iron.**—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham; £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

*** Hematite.**—Si less than 2 per cent, S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s. 0d.; Birmingham, £25 13s. 0d.; South Wales (Welsh iron), £23 19s. 0d.

*** Basic Pig-iron.**—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £45 0s. 0d. to £48 0s. 0d., scale 15s. 0d. per unit, lumpy, 75 per cent. Si, £62 10s. 0d. to £66 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 14s.1d. per lb. of Mo

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 10s. 3d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 13s. 3d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £80 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr.; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 10½d. to 2s. 1d. per lb. Cr. * Average 68-70 per cent.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent. Cb + Ta, 19s. 0d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £58 10s. 0d.

SEMI-FINISHED STEEL

*** Re-rolling Billets, Blooms, and Slabs.**—BASIC: Soft u.t., 100 tons and over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 100 tons and over, £32 5s. 6d.; hard (0.41 to 0.60 per cent. C), 50 tons and over, £33 17s. 0d.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting, 50 tons and over, £35 4s. 6d. SIEMENS MARTIN ACID (50 tons and over): Up to 0.25 per cent. C; £40 11s. 0d.; silico-manganese, £43 4s. 0d.

*** Billets, Blooms, and Slabs for Forging and for Stamping** 50 tons and over).—BASIC: Soft, up to 0.33 per cent. C, £37 0s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £38 2s. 6d.; acid, up to 0.25 per cent. C, £41 14s. 0d.

FINISHED STEEL

*** Heavy Plates and Sections** (50 tons and over).—Ship plate (N.-E. Coast), £40 7s. 6d.; boiler plates (N.-E. Coast), £42 17s. 0d.; floor plates (N.-E. Coast), £41 16s. 0d.; angles (N.-E. Coast), £38 1s. 6d.; joists (N.-E. Coast), £37 17s. 6d.

*** Small Bars, Sheets, etc.**—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 6d.; under 4 tons to 2 tons, £41 3s. 6d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 4s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 16s. 0d.; nickel-chrome, £100 18s. 0d.; nickel-chrome-molybdenum, £113 11s. 0d., in lots of 25 tons and over.

NON-FERROUS METALS

Copper.—Cash, £226 0s. 0d. to £226 5s. 0d.; three months, £230 5s. 0d. to £230 10s. 0d.; settlement, £226 5s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 3½d. per lb. rods, 249s. 0d. per cwt. basis; 20 s.w.g., 284s. 0d. per cwt.

Tin.—Cash, £933 0s. 0d. to £935 0s. 0d.; three months £946 0s. 0d. to £947 0s. 0d.; settlement, £935 0s. 0d.

Lead (Refined Pig).—Second half September, £63 12s. 6d. to £63 15s. 0d.; second half December, £65 7s. 6d. to £65 10s. 0d settlement, £63 15s. 0d.

Zinc.—Second half September, £73 10s. 0d. to £73 12s. 6d.; second half December, £73 15s. 0d. to £73 17s. 6d.; settlement, £73 12s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £111 10s. 0d.; rolled zinc (boiler plates), all English destinations, £109 5s. 0d.; zinc oxide (Red Seal); d/d buyers' premises, £90 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes 1s. 10½d. per lb.; sheets to 10 w.g., 198s. 9d. per cwt.; wire, 2s. 8½d.; rolled metal, 198s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £173; B6, £222.

Brass (High Tensile).—BS1400, HTB1, £193; HTB2, £211; HTB3, £226.

Gunmetal.—BS1400, LG2, £214; LG3, £224; G1, ½% £296; G1, 1%, £286.

Phosphor Bronze.—BS1400, PB1 (AID released), £314; BS1400, 90/10/1, £302.

Leaded Phosphor Bronze.—BS1400, LPB1, £238.

Phosphor Bronze Strip, etc.—Strip, 303s. 9d. per cwt.; wire, 4s. 2½d. per lb.; rods, 3s. 5½d.; tubes, 3s. 5½d.; chill cast bars, solids 3s. 5½d.; cored, 3s. 6½d. (CHARLES CLIFFORD LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 11½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 4½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 3½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £230 0s. 0d. Quicksilver, ex-warehouse, £62 0s. 0d. Nickel, £660 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £240; AB2, £248.

DOING WHAT COMES NATURALLY

Baby birds just naturally expect the right food to be dropped into their beaks; and when engineers specify Platt's non-ferrous metals, they are just as confident that they will receive exactly what they need. Platt's themselves are like the mother-bird—doing what comes naturally—by giving you consistent purity and meticulous specifications, in the production of **brass, bronze, gun-metal, zin cand lead alloys.** Ask Platt to quote you. Their keen prices may well surprise you.

Platt METALS LTD

ENFIELD, MIDDLESEX. HOWARD 3351

PIG IRON, All Grades
METALLIC ABRASIVES
SHOTBLASTING MACHINERY
FOUNDRY MACHINERY

WILLIAM
JACKS
AND COMPANY LIMITED

HEAD OFFICE
WINCHESTER HOUSE
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Midland 3375/6

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FERRO SILICON 12/14%
ALLOYS & BRIQUETTES
FOUNDRY COKE
LIMESTONE
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MOULDING SAND
REFRACTORIES

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CLASSIFIED ADVERTISEMENTS

PREPAID RATES: **Twenty words for 10/- (minimum charge) and 4d. per word thereafter. Box numbers 2/6 extra per insertion (including postage of replies). Situations wanted 2d. per word throughout.**

Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House, 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

FOUNDRY FOREMAN (42) desires change with prospects of advancement. 12 years foreman in ferrous, mechanised and jobbing, control of sand, cores and cupola, and all estimates. Box FF953, FOUNDRY TRADE JOURNAL.

YOUNG MAN—live wire—wants more lucrative position. Now earning £1,800 p.a. as Foundry Director. A.I.M., M.I.B.F. Box YM962, FOUNDRY TRADE JOURNAL.

METALLURGIST, 43, F.I.M., M.I.B.F., earning £2,000 p.a., seeks executive position with small firm. Wide knowledge and experience of metallurgy of cast iron, iron and steelmaking. Box MF905, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

FOUNDRY Equipment Manufacturers require REPRESENTATIVE in Yorkshire. Please apply to Box FE941, FOUNDRY TRADE JOURNAL.

WADKIN Universal Wood Miller required. Please send details to Box WU950, FOUNDRY TRADE JOURNAL.

EXPERIENCED FLOOR MOULDERS wanted, good wages and bonus paid, overtime worked. Apply WALTER W. HOSKEN LTD., 62 Willow Walk, Bermondsey, S.E.1.

REORGANISATION by a reputable firm of Ironfounders has created a vacancy for a first class experienced SALESMAN. Box RB957, FOUNDRY TRADE JOURNAL.

SKILLED MOULDERS, jobbing non-ferrous foundry, central Birmingham. Good piece rates. Box SM966, FOUNDRY TRADE JOURNAL.

FOUNDRY MANAGER, with engineering background to be responsible for self-contained unit utilising both hand and mechanical casting of copper-base alloys. Details of experience with salary required to Box FM958, FOUNDRY TRADE JOURNAL.

PRACTICAL MAINTENANCE ENGINEER, preferably with some administration experience, for small iron foundry in North Staffordshire. Interesting position with prospects for ambitious person willing to co-operate with Director on production planning, etc. Scope for travel if interested. We are NOT looking for a man who wishes to remain purely a maintenance engineer. Genuine applications only, in confidence, stating fullest details of experience. Box PM929, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

Malleable Cast Iron Foundry

now in process of mechanisation requires a

FOREMAN

A good opportunity for young man having experience in the above sphere. Full details in confidence, to

BOX MC 961 F.T.J.

AN exceptional opportunity occurs in London area for a young man with selling experience and knowledge of foundry trade. Some connection an advantage. This post offers particularly good prospects to right man. Write giving fullest details. Box AE964, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required by South of England Iron Foundry. Previous experience of green, dry and CO_2 moulding and Sand rammer production. Good prospects for man with practical experience and initiative. Apply Box FF942, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required for grey iron foundry using green sand and CO_2 process for producing plate and cored castings up to 10 cwt. Good prospects for young man with practical experience and good technical background. Preference given to applicant possessing National Foundry College Diploma. Apply PERSONNEL OFFICER, THOMAS POTTERTON LIMITED, (Member of De La Rue Group), Emscote Road, Warwick.

SITUATIONS VACANT—*contd.*

ASSISTANT PATTERN SHOP FOREMAN required for Midlands light repetition iron founders producing automobile and similar grey iron castings. Write in confidence stating experience, etc. Box AP946, FOUNDRY TRADE JOURNAL.

PATTERNMAKERS
wood and/or metal

required to join our permanent staff. A good pension and insurance scheme is in operation, and overtime optionally available. *Top rates for first-class men.*

B. LEVY & CO. (Patterns) LTD.
1-5 OSBERT STREET,
LONDON, S.W.1.
Phone: VIC. 1073 or VIC. 7486

FOUNDRY UNIT ENGINEER required to be responsible for the control of design, plant manufacture, installation and maintenance of a new foundry process. Qualifications required—H.N.C. minimum; membership of a professional institution would be an advantage. Experience in non-ferrous foundry engineering would be considered an asset but is not essential. Age range 25-35 years. Salary scale £1,050—£1,300 per annum. Applications should be sent to the PERSONNEL MANAGER, DUALLOYS LTD., Boden Street, Chard, Somerset.

SKILLED JOBBING MOULDERS

Vacancies for first class men experienced in machine tool, pump and special purpose castings up to 3 tons in weight in high duty grey iron and non-ferrous metals. Pleasant house will be offered to keen young moulder after one month's trial.

Apply in writing to:—

THE
HIGH WYCOMBE FOUNDRY CO. LTD.
Chapel Lane, Sands, High Wycombe, Bucks.

WORKS MANAGER

We invite applications for this position, carrying full responsibility for all activities in a modern mechanised foundry producing Blackheart malleable castings. Applicants must have held a post with a similar level of responsibility, but not necessarily in a malleable foundry. Salary will be appropriate to such experience, and carries a generous Pension Scheme and Life Assurance. Confidential applications to:—

Works Director,
SHOTTON BROS. LTD.
Oldbury.

SITUATIONS VACANT—*contd.*

DRAUGHTSMEN required for Pattern Shop. Must be familiar with Mechanised Foundry methods and capable of laying out complete sets of equipment from component drawings and engineering instructions. Apply to: PREMO PATTERN CO. LTD., Edgbaston, Birmingham 15.

AGENTS

SMALL West Midlands Grey Iron Foundry wishing to expand seeks AGENT to introduce repetition work, commission basis. Foundry capable of competitive prices and efficient deliveries. Box SW959, FOUNDRY TRADE JOURNAL.

TENDERS

THE OFFICER OF THE INDIAN RAILWAYS, CHITTARANJAN LOCOMOTIVE WORKS, CHITTARANJAN, WEST BENGAL, INDIA, invites tenders for the supply of the following plants for the Steel Foundry with an initial annual capacity of 7000 tons of castings to be expanded to 10,000 tons per annum.

Tender No.	*Item.*	*Cost of Tender Document.*	*Due Date.*
SFM-61/09/29A	Light Machine Moulding Layout	£3 15s. per tender	21.12.61
SFM-61/09/33A	Four Portable Mould Driers	£1 10s. per tender	22.12.61
SFM-61/09/34A	Two Metal Carrying Ladle Waggons	£1 10s. per tender	22.12.61

Specifications, etc., relative to the above tender enquiries can be obtained from the **CO-ORDINATION BRANCH, INDIA STORE DEPARTMENT, BROMYARD AVENUE, ACTON, W.3.** The cost of the tender sets are as indicated above and are not refundable. Tenders are to be returned direct to the General Manager, Indian Railways, Chittaranjan Locomotive Works, Chittaranjan, West Bengal, India, so as to reach him by the dates indicated above.

Specimen copy of these tender documents can be seen at the **ENGINEERING BRANCH, INDIA STORE DEPARTMENT, BROMYARD AVENUE, ACTON, W.3,** under the following reference number S.3420/61/NSC/ENG.2.

THE DIRECTOR GENERAL OF INDIA STORE DEPARTMENT, GOVERNMENT BUILDING, BROMYARD AVENUE, ACTON, LONDON, W.3, invites Tenders for the supply of:—

REF. No. 24016.61/HSK/HAL (2)

PNEUMATIC JOLT SQUEEZE DRAW MOULDING MACHINES FOR FOUNDRY PLANT, capacities 250 lb. and 1,100 lb., table 18 in. by 26 in. and 28 in. by 36 in. respectively.

The tender forms with schedules and specifications which are returnable on Thursday, 26th October, 1961, may be obtained from the above office (C.D.N. Branch) on payment of a fee of ten shillings (not returnable) for each tender.

The applications for tenders should clearly state the above reference numbers.

BUSINESS OPPORTUNITIES

FOR SALE. Freehold Grey Iron Foundry and Engineering Works. Approximately 1¼ acres. Overhead cranes installed. Land for extension. Buildings suitable for any purpose. Adjacent to railway line and main road. Ammanford area. Box FS939, FOUNDRY TRADE JOURNAL.

For Sale Privately

AS A GOING CONCERN

Old Established Iron Foundry
with long standing connections excellently situated in South Yorkshire and having
Substantial Buildings and Equipment
(Floor area approx. 27,000 sq. ft.)
with Over 2 Acres of Freehold Land
and over ½ acre of Leasehold Land.
Producing an excellent range of Rainwater and Soil Goods and having a regular and skilled labour force of approx. 120. Foundry capacity approx. 100 tons per week.
Ample land for expansion.

For details apply to:

ELLIS, WILLIS & BECKETT,
Chartered Auctioneers, Valuers & Estate Agents
54 Campo Lane, Sheffield 1 Tel: 22377-8

BUS. OPPORTUNITIES—*contd.*

OWING TO

GENERAL REORGANISATION

and change of production emphasis a sizeable Group of Companies is considering closing down its own iron foundry. This will leave approximately **£250/£300,000 P.A.** of mainly repetition castings to be placed for outside customers and own use.

Necessary plant, boxes and other equipment are available for removal and probably some key labour if desired.

All propositions submitted in writing will be considered.—BOX OT255.

PATENTS

THE proprietor of British Patents Nos. 711295 and 711339, both entitled "Mulling Apparatus" offers same for license or otherwise to ensure practical working in Great Britain. Inquiries to SINGER, STERN & CARLBERG, 140 So. Dearborn Street, Chicago 3, Illinois, U.S.A.

MACHINERY WANTED

Cleveland Plant and Machinery Co., Ltd.,

want your

Surplus Foundry Plant and Forging Equipment

Best prices given

Wharncliffe House
44 Bank Street
Sheffield, 1
Tel. No. 29051

MACHINERY WANTED—*contd.*

ROLLER TRACK required in good condition. Heavy duty—18 in. wide. Box RT951, FOUNDRY TRADE JOURNAL.

ONE or two plain Squeeze Moulding Machines wanted. Coleman-Wallwork KH preferred. State price, condition, where to view. Box OO963, FOUNDRY TRADE JOURNAL.

WANTED. Modern 24 in. or 30 in. D/E Grinder complete with Dust Extractor. Also 5, 10 or 15 ton, 400 volt A.C. O/H Travelling Crane, 42 ft. span or larger. Box WM960, FOUNDRY TRADE JOURNAL.

WANTED. Pneulec Sand Royer, or other similar sand conditioning machine. Will recondition older machine if price reasonable. Box WP945, FOUNDRY TRADE JOURNAL.

WANTED—ONE AUTOMATIC SUTTER SHELL MOULDING MACHINE, preferably a Foundry Equipment No. 1100 with Standard Pattern Plate, size 41 × 26, complete with control panels. Please give full particulars, including year of manufacture, and where machine can be inspected, to Box WO926, FOUNDRY TRADE JOURNAL.

MACHINERY FOR SALE

FOR SALE. One brand new August Porto muller, unused. Apply C. F. DOYLE, LTD., Weston Works, Faversham.

LEES HALL ½ ton Oil Fired ROTARY FURNACE for Aluminium Smelting. Good condition. Can be inspected at E. J. HARRISON LTD., Edmar Works, Mill Green Road, Mitcham, Surrey. MIT 1881.

FOR SALE. Morris 37 ft. 4 in. Soan two Girder type 2 ton capacity cab operated overhead travelling crane in first class condition. Apply: FRANK SALT & CO. LTD., Station Road, Blackheath. Phone: BLA 1635.

TWO B.M.M. Jolt Squeeze Turnover Moulding Machines, Model R.D.O.
B.M.M. Jolt Squeeze Turnover Moulding Machine, type R.D.5.
Lees Hall Gas Fired Crucible Furnace, cap. ½ ton aluminium, complete with blower.
Brayshaw Gas Fired Muffle Furnace, 40 in. × 30 in. × 18 in. with blower, unbricked.
Sirocco 30 in. dia. Cupola Blower.
Richards Sandmaster Portable Electric Sand Conditioning Machine.
15-cwt. Roper Hand Geared Crane Ladle. Oil bath gearing.
Wide range of Air Compressors always in stock.
Inspection: Thames Road, Silvertown, London, E.16.
40 in. × 32 in. airless rotary Shot Blast "Sand Wizard" Machine, with dust extractor, etc.
Available ex site London area.

THOS. W. WARD LTD.
BRETTENHAM HOUSE, STRAND, LONDON, W.C.2.
'Phone TEMple Bar 1515 (12 lines)

Remember • Wards might have it!

MACHINERY FOR SALE—*contd.*

SAND SLINGERS BY FOUNDRY PLANT & MACHY.:
20 in. head, 10 ft. radius.
20 in. head, 12 ft. radius.
10 in. head, 3 ft. radius.
FORDATH SAND MIXERS:
No. 1 size 12 in. dia. pan.
Type Ca, 1 ft. 6 in. dia. pan.
SAND MILLS:
Pneulec 6 ft. dia. pan.
August-Simpson 6 ft. dia. pan.
Mullrex No. 2, 4 ft. 6 in. dia. pan.
Also, 3 ft. 6 in., 4 ft., 6 ft. dia., belt-driven.
Two FABRICATED TURNTABLES, approx. 7 ft. 6 in. dia. × 3 in./4 in. high, with set Ball Brgs. and bottom track which is fixed to floor.
"SHERWEN" FOUNDRY KNOCKOUT, 5 ft. 6 in. × 8 ft. complete with all electrics.
SAND DRYERS:
Elec. 3 ft. 6 in. × 2 ft. 6 in. × 3 ft. 6 in. high, hinged lid, hand recip. shaker, etc.
ACME coke-fired 3 ft. 6 in. × 2 ft. 6 in. × 3 ft. 6 in. high.
FORDATH Senior stationary type 4 ft. 9 in. /2 ft. 6 in. dia. × 6 ft. 2 in. high, gas-fired.
HOT AIR UNIT for Moulds:
No. 2 "Newstad" capacity 30,000 cu. ft. hot air per hour 400 deg. C. with self-supporting structure mounted on heavy castors. AS NEW.
Also ALL TYPES FOUNDRY PLANT & EQUIPMENT.

S. C. BILSBY & CO.
Hainge Road, Tividale, Staffs.
TIPton 2448
(Established over 40 years)

Fordath motorised oil sand mixer, A.C., 3 phase. 1 cwt. capacity. As new. £155.0.0d.
5ft. Jackman sand mill. Modern ball-bearing machine. As new. £230.
Titan Coreblower, 75lb. capacity. Almost new.
Abrasive development Aqua-Spray wet type Blast machine. Almost new.
Large and Standard size Adaptable Moulding machines.
Modern Rumbling Barrel, 6ft. by 3ft.
Large stock of geared Ladles up to 8 tons capacity. List on request.
Few Roper ladles and Roper ladle hoists, 3- and 5-cwt. capacity.
New Bale-out and Lift-out Furnaces. Please send for illustrated leaflets.
Monometer 800lb. Aluminium capacity. Rotary Furnace.
Large stock of small Moulding Boxes at low prices to clear. List on request.
Several Cummings coke-fired furnaces.
Cummings oil-sand mixer.
Two Pneulec jolt squeeze Moulding Machines.
200 assorted Keith Blackman fans.
Lathe, 5in. all geared head. £50.
Please write for new stock list.

ELECTROGENERATORS LTD.
Australia Road, Slough, Bucks.
Tel: Slough 22877 & 22094

Roper
LADLES
STOCK UP TO STON CAP.
E. A. ROPER & CO. LTD.
KEIGHLEY • Phone: 4215-6

MACHINERY FOR SALE—*contd.*

SAND MIXERS and DISINTEGRATORS for Foundry and Quarry: capacities from 10 cwts. to 10 tons per hr.—W. & A. E. Bealey (Machinery), Ltd., Misterton, nr. Doncaster. Tel.: Misterton 202.

MORRIS MOTORISED Portable Sand Riddle, pneumatic tyres, £175. Fordath 3 h.p. Core Mixer, £85. 150 lb. oil fired furnace with fan complete, £87 10s. Sklenar 200 lb. furnace, oil fired with fan etc. complete, £125. Avery 800 lb. Dial scale, £87 10s. Birkett 14 in. 5 h.p. cutting-off wheel, £75. Brand new 7 cub. ft. automatic 150 lb. air compressor 2 h.p. standard voltage, £87 10s. Quantity Moulding Boxes. Inspection invited.

BENSON & CLARK LTD.,
Stanley St., Newtown, Wigan
Phone 45996

ETHER Combined Temperature Indicators and Regulators, zero/1,000 deg. C. Six Instruments.
ETHER Combined Indicator and Chart Recorder, zero/1,000 deg. C. Two Instruments.
TWO G.E.C. Photo Cell Equipments comprising Projector type LLH, Control Relay type A, and Photo Equipment, type MD.
TWO Process Timers by Burrell, Sheffield, zero/30 seconds.
FIVE ETHER type 650 "Throttltrol" Control Units.
SIX McLAREN Protective Thermostats, 250/1/50, 5 amperes, 200/750 deg. C.
ALL ABOVE SECOND-HAND, UNUSED.

WHITEFIELD MACHINERY & PLANT LTD.
48 Chatham Street, Edgeley, Stockport, Cheshire.

600
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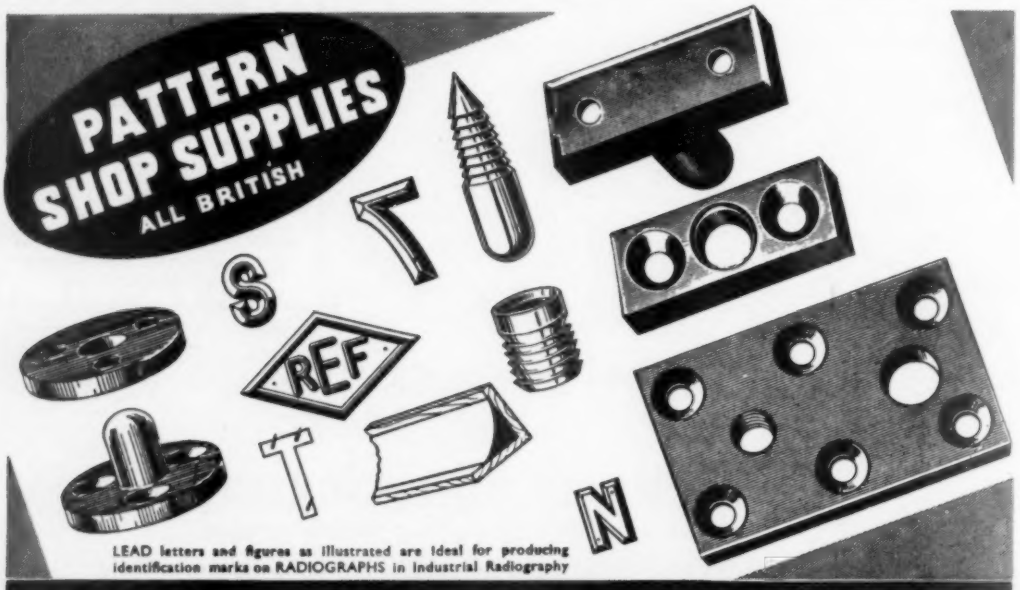

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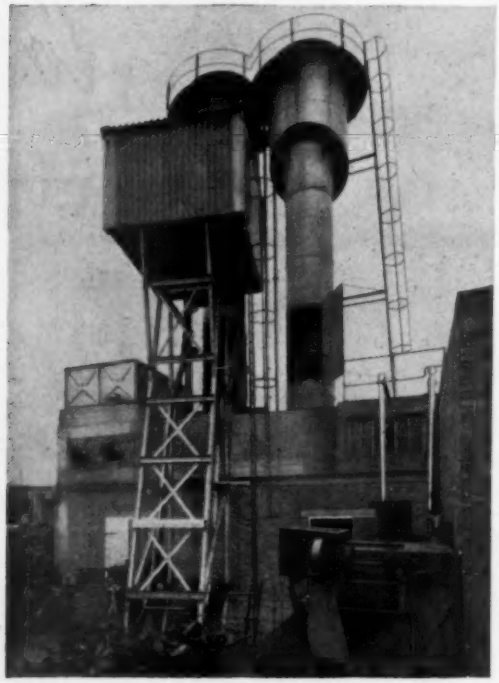

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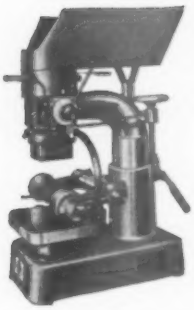

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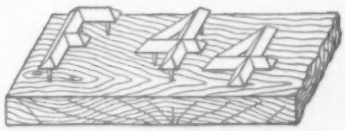

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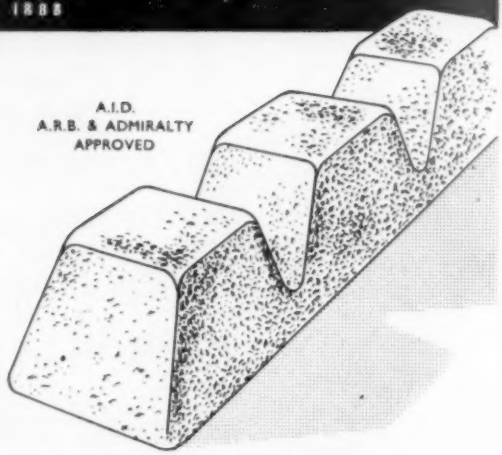

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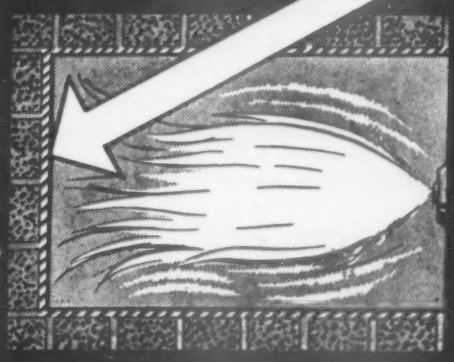

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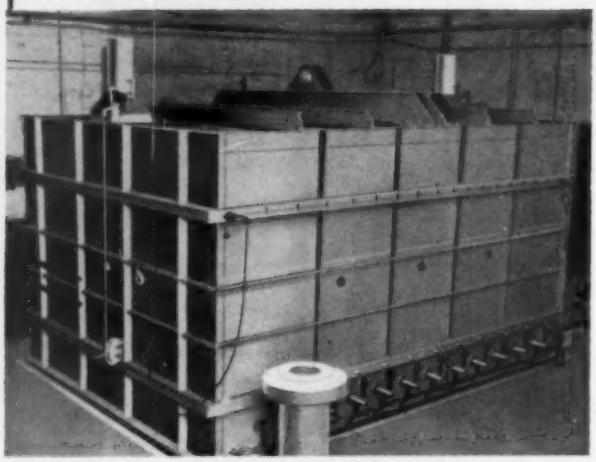

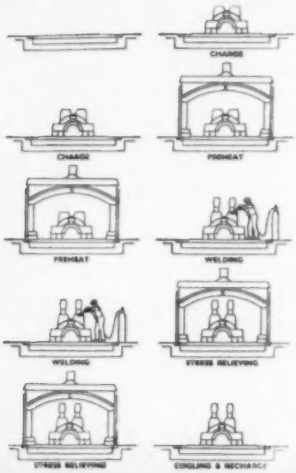

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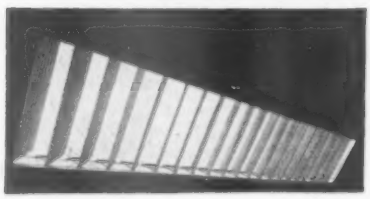

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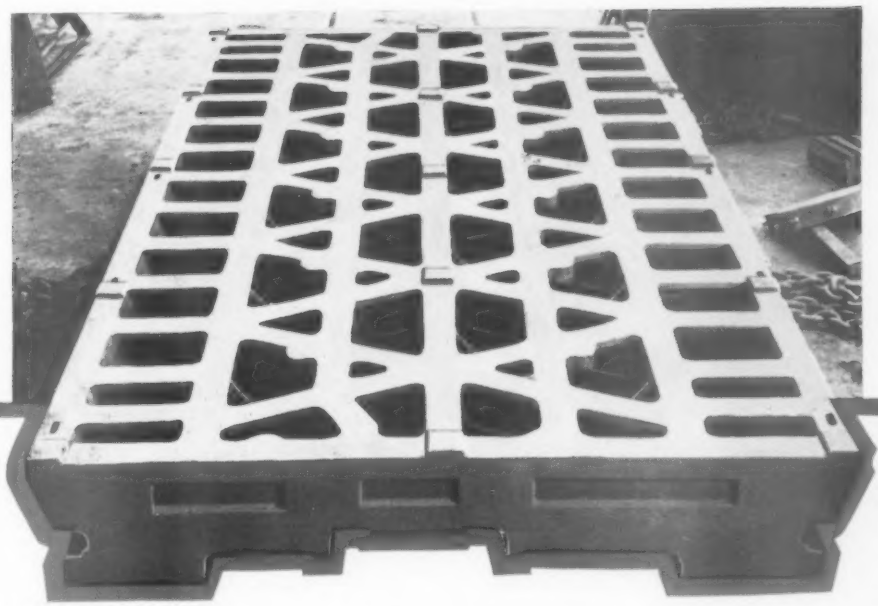

COROVIT SLASHES COREMAKING COSTS

at George Richards' Foundry

The coremaking time for the above 14 ton bed casting (19′ x 9½′ x 1¾′) for a horizontal boring machine was cut from 300 hours to 129 hours by using the Corovit cold setting technique. Further savings were made in decoring and fettling times, because Corovit cores reproduce accurately the dimensions of the corebox. And, of course, Corovit gives an improved finish, substantially reducing subsequent machining.

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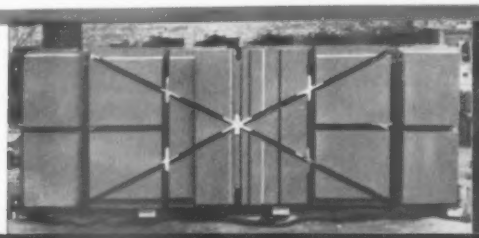
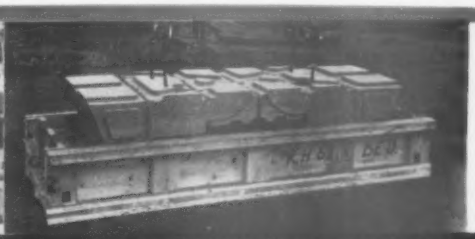


Above: One of the six 30 cwt. cores used in making the 14 ton casting. Each core measured 8′ x 3′ x 1¾′.



Above: Unstoved cold-set Corovit cores being lifted from the corebox in the green state.

THE FORDATH ENGINEERING COMPANY LIMITED, BRANDON WAY, WEST BROMWICH, STAFFS, ENGLAND.
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